# SIMPLIFYING TEACHING

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TO
C. F. R.
A Patient
and
Critical Listener

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# PREFACE

One of the most noticeable characteristics of modern educational theory is the extent and complexity of its terminology. Teachers of education appear to have taken delight in multiplying special names and phrases to describe the various elements of the learning and the teaching process. Young students in normal colleges and teachers training schools are today confronted by strange new phrases and connotations for words apparently old and familiar. He must try to digest such expressions as the felt need, the inner urge, intrinsic and extrinsic interests, drive, integration, social situation, purposeful activity, project, problem, objectivity, subjectivity, the learning curve, stimulus, response, bonds, manipulation of the environment, distributed practice, instructional leads, concomitant learnings, sigma, coefficient of correlation, homogeneity, heterogeneity, synapses, and so on. One English educator has apparently found it impossible to express in any existing English words certain combinations of ideas, and has brought into the vocabulary of education two Greek words, *horme* and *mneme*. It is greatly to be feared that under the bludgeonings of such expressions the head of the young student, unlike that of the poet, will be both bloody and bowed.

The writer is not implying that all of these special terms have no real value or use; many of them are, indeed, indispensable to the student of special branches of educational theory. It seems to him, however, that many are really names for the same

things, and that the unavoidable complexity of the process of dealing with boys and girls in the classroom is not much helped by complexity of the terms and phrases used to describe it.

In his experience in teaching students of education, the writer has been impressed with two evil results of the multiplication of technical language. The first is the habit, prevalent particularly among the serious and enthusiastic, of accepting the new terms with avidity, and acquiring a lip-service of modern education with but little depth of comprehension of the thought behind the words. Such students frequently pass excellent examinations, to be sure; but when they return to the classroom, they either forget their new terms in the stress of actual teaching, carrying on their work as the needs of the moment seem to dictate, or else they are prone to make absurd blunders in an attempt to put into practice some theories of which they know the terms but not the fundamental ideas.

The second evil result of the multiplication of technical expressions is that some of the more skeptical students decide that the whole fabric of modern education is merely the same dress which it has always worn, mended here and there with patches woven of new and attractive colors. Such students, floundering at first in a welter of new terminology, become disgusted and decide with Hamlet, that it is all merely "words, words, words."

It is the conviction of the writer that we need to simplify and coordinate our thinking about the teaching process. We may well attempt to reduce it to its

lowest terms, and then we can grasp more clearly its meaning and method. It is to this task that this book is devoted in the hope that the teacher may have a surer control of his work and that he may be able to see more clearly its strong and weak points. The writer believes, moreover, that the supervisor will find here a usable method of attack, either in judging the work of a recitation or in explaining his own ideas to the teacher.

The author wishes to express his gratitude and deep sense of obligation: to his father and mother, both teachers and students of childhood, who first turned his thoughts toward the study of education; to Professor Frank M. McMurry, for leadership and guidance in helping him to develop theories of classroom work; to the students who have participated in forming the ideas in the book through discussion and constructive criticism; to Miss Mary Lothrop, who recorded the lessons in Chapters V and XIII; and to Miss Alice V. Keliher, who wrote the exercises at the end of each chapter.

Thanks are due to the Teachers College Bureau of Publications for permission to use the lesson in Chapter VII, and much of the material in Chapters VIII and X which was taken from articles by the author in the *Teachers College Record.*

To his teacher, colleague, and friend, Professor Milo B. Hillegas, whose kindly criticism, personal inspiration, and sound educational common sense have been a constant source of guidance in his thinking, the author owes a debt of gratitude of which he becomes more profoundly sensible day by day.

# CHAPTER I

## WHAT TEACHING IS

**Learning as an active process.** If one defines teaching as the *imparting of knowledge,* he is faced with a strange paradox. For if the definition be taken in the same sense as the imparting of money by gift, then the fact is that no one has ever taught any one anything of consequence. Knowledge cannot be passed directly from one person to another as money can be put into one's pocket by another person. In its essence, learning implies an actual change in the nerves and brain fibers, which indicates some measure of attention and desire on the part of the learner. It is this attention and desire which teaching must secure, or its efforts are vain. Witness the attempts, for example, of a teacher trying to instruct a class of boys on a warm spring day when their thoughts are on kites or baseball. Or remember your own experience when you read an entire page—or rather your eyes followed the words and your inner speech pronounced them—yet you learned nothing from the page because your attention was directed toward something else.

Reduced to its lowest terms, then, teaching consists in putting the learner into a frame of mind to receive and acquire knowledge, and then in guiding his activity aright. This principle sounds so simple and obvious as scarcely to need stating. It *ought* to be axiomatic, yet every day in thousands of class-

rooms it is being grossly violated. Multitudes of teachers are doing the majority of both the talking and the thinking in their classrooms under the impression that they are imparting knowledge. For over a hundred years, self-activity has been recognized by educational theorists as the only way of learning, yet pitiful inefficiency in the application of the idea is still all too frequent in our schools. We still seem to think that we can endow children with learning by talking to them.

Of course the stubborn fact remains, however, that teaching and learning have been going on for untold generations. Certainly, throughout the existence of mankind and probably far down the scale in the animal species, the old have been teaching and the young have been learning. Progress in the science of education has not consisted in making possible a hitherto unknown process; we have simply learned how to perform more efficiently an age-old one.

Such progress in efficiency has been due largely to a better knowledge of what the mind is and how it works. If, as stated above, teaching consists in setting in motion and directing a mechanism we call the brain, then it is obvious that the more we know about that mechanism, the better can we direct it. In the past three decades amazing progress has been made in the field of experimental psychology, and we are now in a position to speak with some authority about the learning and teaching process in its psychological aspects.

**The older concept of mind.** Up to a comparatively short time ago, the mind was thought of as an aggre-

gation of powers or faculties, such as memory, logic, will, imagination, perception, and so on. Each of these was thought to be quite separate from the others, and capable of being exercised and trained by itself. Memory, for example, could be trained by learning vocabularies in Latin or Greek, and that training was supposed to improve a child's memory for dates in history or locations in geography. The will could be trained by forcing the child to do unpleasant things. The faculty of logic could be trained by the study of syllogisms, geometry, or grammar. Under the influence of this psychology, the aim of education was to produce a mind, all of whose faculties had been systematically exercised and highly disciplined; the subject matter for this training was considered of secondary importance. No one defended, for example, the practical usefulness of geometry; its value lay in its mental training.

As a result of experiments in psychology, we know now that this whole conception of the nature of mind is false. For a full treatment of the modern point of view in psychology, the reader should consult one of the modern textbooks on the subject; we have space here to present only the barest outline of its fundamental conclusions.

**The modern concept of mind.** Modern psychology conceives of the mind, not as a compact group of relatively large divisions or faculties, but as a collection of several billion tiny nerve fibers or cells, each of which has learned, or is capable of learning, a definite function. Of course, these neurones, as they are called, seldom act as individuals, but are organ-

ized into systems to perform various mental and physical functions. These functions, however, are very specific. For example, when one says, "Six times five" to a fifth grade child, he instantly responds with "Thirty." This means that a group of his neurones has been strengthened and organized into such a system that he gives the correct answer to the multiplication combination. But while the neurones were being trained to respond correctly when he hears "Six times five," it does not mean, as was formerly supposed, that any general faculty or power of memory was being trained. Those neurones were trained in that specific situation to give the correct response.

We have spoken above of the response to a situation. Learning is today thought of in these terms; that is, the child is placed in a situation; as a result certain activity is set up in his nervous system, and then he responds to the situation. Since his neurones form the connection between the situation and the response, they are spoken of as bonds, and the symbol S→R (Situation to Response) is frequently used to represent them.

**How the meaning of teaching is affected by this concept.** The essence of the teaching process now becomes clear. It is to secure such situations as will strengthen and organize those sets of bonds which will be useful to a child in both his present and his future needs. In his work in arithmetic he is taught how and when to perform the necessary calculations to get answers that are helpful in solving his present or future number problems. In his history work he is taught facts of the past which will strengthen and en-

rich his understanding or interpretation of the present. In spelling he learns such words as he will actually need to spell. Instead of relying on some mysterious transfer of power, so that, for example, when he learns to do cube root, his mind will be better trained to solve the problems of his everyday life, we are teaching those processes and facts which we know will be of immediate or future use.

Modern psychology, then, has shown us that we must change the material which we have been presenting to children. It has also shown us that we must change our methods of instruction if we would procure better learning. We have spoken of teaching as direction of the process of organizing and strengthening mental bonds or neurones. Like all natural processes, this is controlled by certain specific laws; and through experiments on animals and on human beings these laws have been discovered. They have, of course, been in existence and in operation as long as has learning itself; their discovery did not make possible a new process called teaching, but it gave us a more exact knowledge of what that process really is. With this greater insight into these laws in accordance with which we must work, great progress is possible.

**The failure of the laws of learning to help teachers.** It has been a disappointment to many educators, however, that so little practical help from such understanding has been secured for the teachers. Many students of education in their psychology classes have conscientiously memorized the laws of learning; have seen their reasonableness as an expla-

nation of how learning takes place; and then in classroom situations have completely failed to turn them to practical use as guideposts in teaching. Moreover, in the application of the laws, leadership on the part of educational theorists has been conspicuously lacking; instead they have worked out a multitude of special methods, plans, and devices which were probably based by their originators on these laws, but which have frequently undergone amazing and serious distortion when applied by inexperienced teachers. Some examples of these special methods are: the socialized recitation, the supervised study plan of teaching, the problem method, the project method, the Winnetka Plan, and the inductive or deductive approaches.

When the writer was a boy, he used to play a game in which the participants sat in a row, and the first player rapidly whispered some phrase into the ear of the next. This one repeated it to the next, and so it was passed on down the line. When the last one repeated what he had heard, it was usually the occasion of considerable mirth to see how widely and ridiculously it differed from the original phrase.

Precisely this process has occurred with many of our special methods. After being passed through supervisors to principals and through principals to teachers, they would be unrecognizable by their originators. Frequently the teacher catches a phrase or two, and pinning his faith on these, goes blithely along his educational way, sure that he is teaching according to the very latest method. For example, not long ago the writer saw a stereotyped, cut-and-dried question and answer recitation, without a single redeeming in-

stance of pupil thinking, planning, or purposing, which the teacher firmly believed to be a socialized recitation. Her reason for this belief lay in the fact that she had heard that the distinguishing feature of a socialized recitation is the presence of a pupil in the front of the room in the rôle of the teacher. When, therefore, she had called John Jones to her desk, she had felt that the problem of a socialized recitation was solved.

The fact is that all special methods are but adaptations of the laws of learning. In the very nature of the case it *must* be so, for these laws explain how learning must take place. Special methods are merely efforts to put a richness of interpretation into the stereotyped psychological statements in which the laws are phrased. This richness, our psychology classes have conspicuously failed to give them.

It is the contention of this book that, instead of transmuting the laws of learning through a host of pedagogical names and special methods into a form of classroom procedure, it would be wiser to try to get teachers to understand them more thoroughly, to interpret them more broadly, and consciously to put them to use in their classrooms. If the laws explain the learning process, then they should guide the teaching process. Our aim, then, is to endow them with such richness of meaning as will give a teacher firm ground to stand upon without mechanizing or narrowing his classroom methods.

**The laws place emphasis on the child.** One of the most valuable results of an attempt at the direct use of the laws of learning in planning lessons is that such

a procedure centers attention where it belongs; namely, in the activities of the learner rather than of the teacher. In our methods classes and in lesson planning we have too frequently gone at the work from the opposite point of view. We have made primary the technique of the teacher—his tone of voice, his classroom manner, what questions he shall ask, how he shall manage discussion, and so on. This automatically makes secondary what goes on in the mind of the child. Teaching methods have been thought of as causes, and the work of the pupil as effects. While this is, of course, true, yet in a larger sense in planning work for the classroom, the needed mental activity is the cause which governs the teacher's plans as an effect.

It would be easy to engage in profitless hair-splitting on this point, for it is not a question of absolute truth, but of relative emphasis. If, in planning his work in accordance with the laws of learning, the teacher emphasizes not what he wants to do but what he wants the children to do, he is placing the emphasis where it belongs, and his work becomes psychologically sounder.

**Summary.** Teaching is not a process of imparting knowledge; it is a process of stimulating the student to learn, and of guiding his work. Modern psychology has helped us to understand the task through showing us the specific nature of learning and through discovering its laws. Teaching consists simply in putting these laws to work. Progress in education consists not so much in the multiplication of special terms and methods, as in a deeper and richer inter-

pretation of these laws in classroom practice, thus centering attention where it belongs; namely, on the mental activities of the learner.

### Study Exercises

A boy eight years old has always lived in a city apartment. He moves to a suburban home which has a vacant lot adjoining it. The neighborhood boys play baseball there every day. The new boy does not know how to play baseball at first. The boys need another boy to make up their team. They teach him to play. He likes the game so much that he plays each time the boys give him a chance. When the boys are not there he practices running bases or batting by himself.

1. What importance do you attach to the boy's desire to learn to play baseball?
2. What factors in the situation brought about the boy's strong desire to learn the game?
3. Do you find in this situation a teacher? a student? learning?
4. In the final analysis whose activity produced actual learning, the teacher's or the learner's?
5. Can you show how learning to play baseball produced actual changes in the boy? After he has learned to hold the bat properly, has a change been produced in him?
6. What connection do you find between the boy's mental activity and his skill in handling the bat?
7. When we say the boy has "learned" to pitch a curve, what do we imply about neurone connections or S→R bond systems?
8. During the process of learning the game, how does the boy distinguish between the right and the wrong of his activities? How important is the teacher here?
9. Do you find any drill in this learning situation? What would motivate the boy to drill himself?

10. Describe a schoolroom situation in which the child might be as eager to learn as the boy learning baseball. You might describe:

A first grade child first learning to read.

An eighth grade boy studying about electricity.

A third grade child starting to study geography.

## CHAPTER II

## HOW LEARNING TAKES PLACE

**How a knowledge of laws of operation of anything is helpful in using it.** One of the first things a child brought up in a modern home learns to do is to switch the electric lights on and off. He has no knowledge of the theory of electricity, nor of the method of directing electrical power so that it is transformed into light. This process is controlled by definite laws which the child may be said to use when he turns on the light; but though he acts in accord with them, he is ignorant of these laws. If some break in the circuit should occur or if the bulb should burn out, the child would be helpless, having no recourse but to snap the switch back and forth hoping that in some way the light might come on. Moreover, should it become necessary or desirable to alter the position of the light or to install a new one, the child would be impotent to effect the change.

This illustrates what has been, until recent years, the situation of the teacher. Through long race and perhaps individual experience with children, some ways of teaching have been discovered. Teachers have known how to turn on the switch in ordinary cases and children have learned. But if trouble was experienced or if changes in curricula were made, teachers were frequently at a loss to do otherwise than to follow blindly former principles.

We have spoken of teaching as arousing the learn-

er's mental activity and then directing it into productive channels. Like the electric current in the wires, the energy is present in his mind, but methods of arousing and directing it are subject to definite laws, and ignorance of them may result in the teacher's blowing out a mental fuse.

**How repetition produces learning.** As long as learning and teaching have been going on, one condition of the process has been well understood, although its psychological bases have not. It has always been recognized that repetition is indispensable to the acquisition of any knowledge or skill. That practice makes perfect not only has been known for thousands of years, but it is also psychologically sound. We have spoken of the process of learning as exercising and organizing nerve fibers or mental connections or bonds. Repetition is the very heart of this process. It is the way to learn to spell a word, to recite a poem, to skate, to play golf, or to know that 8 times 9 are 72.

Psychologists have studied this law through experiments on animals.

> We take a box twenty by fifteen by twelve inches, replace its cover and front side by bars an inch apart, and make in this front side a door arranged so as to fall open when a wooden button inside is turned from a vertical to a horizontal position. . . . A kitten three to six months old, if put into this box when hungry, a bit of fish being left outside, reacts as follows: it tries to squeeze through between the bars, and bites and claws at its confining walls. Some one of all these promiscuous clawings, squeezings, and bitings turns round the wooden button, and the kitten gains freedom and food. By repeating the experience again and again, the animal comes gradually to omit

all the useless clawings and squirming, jumping actions, and to manifest only the particular impulse (e.g., to claw hard at the top of the button with the paw, or to push against one side of it with the nose) which has resulted successfully. It turns the button around without delay whenever it is put in the box. It has formed an association between the situation, *confinement in a box of a certain appearance,* and the response of *clawing at a certain part of that box in a certain definite way.* Popularly speaking, it has learned to open a door by turning a button.[1]

Experiments in such kinds of human learning as ball tossing, addition, memorizing nonsense syllables, and similar simple mental and physical functions, all bear out the same conclusion; namely, that practice or repetition produces improvement or learning. For example, a child is attempting to learn the spelling of the word *thought.* The process of accomplishing this feat means that he must look at the word many times, must say the letters over and over to himself, and must write them frequently. He is going through the process of so organizing and strengthening the appropriate neurones that whenever he is placed in a situation where he needs the ability to spell that word, the correct response of *t-h-o-u-g-h-t* may follow.

The principle of learning which we have been describing has been called by Thorndike the *Law of Exercise,* for in each case a series of mental bonds or connections between a situation and the appropriate response has been exercised. The law may be stated as follows: "Whenever a modifiable connection between a situation and a response is exercised, other

[1] E. L. Thorndike, *Educational Psychology* (Teachers College Bureau of Publications), Vol. II, p. 9.

things being equal, the strength of the connection is increased."[1]

It seems to be generally agreed among psychologists that this strengthening process means an actual change in the neurones themselves. Learning, then, must be thought of as a physiological thing as well as a mental. It probably represents a true alteration of the nerve fibers—a strengthening of some of them, and an organization of several into a system so that they work together for the accomplishment of some desired end. One use or exercise of the nerve fibers begins this process, but many repetitions may be necessary before a complicated S→R bond is fully learned. To return for a moment to the subject of the first chapter: Teaching consists in helping the child to strengthen right bonds and to organize them into useful systems.

We have spoken above of the fact that one use of a bond does not usually mean that the reaction is learned. This is one reason why a teacher's soliloquy is a poor method of instruction. Even though the learners may seem very attentive, their nerve fibers are exercised but once by his statements; and, therefore, the facts he gives are not learned because there is not sufficient repetition. A complicated bond which is exercised but a few times is easily forgotten, or at least it cannot be readily recalled or used. But even one period of exercise does make some change in a bond. It is this fact which James had in mind when

[1] A. I. Gates, *Psychology for Students of Education* (Macmillan Company), p. 208.

he wrote, "Nothing we ever do is, in strict scientific literalness, wiped out."[1]

**How the law of exercise is limited by satisfaction or annoyance.** Important as is the law of exercise in learning, however, every teacher has found often by sad experience that it is inadequate as a complete explanation of the learning process. Mere repetition does not always produce learning. Many a child has written over and over again a word which he has missed in his spelling lesson, and has still failed to spell it correctly in his next lesson.

The limitations of the law of exercise have also been studied by observing the actions of animals.

A famous experiment, performed by G. W. and E. G. Peckham, will serve as an illustration: These observers found that a spider dropped hurriedly from its web at the sound of a tuning fork. When it had climbed back, a repetition of the stimulus produced the same dropping reaction; but after eight or nine trials the stimulus suddenly lost its power; the spider failed to react by dropping from its web. Next day, however, the stimulus was effective for a time, but failed after six or seven repetitions, and after about ten days the dropping reaction ceased entirely—at least for a time. In this experiment the spider's reaction was in no way blocked; no pain was involved; no definite incongruous reaction was set up. The connection between the sound of the tuning fork and the response of dropping, which was at first prompt and certain, had been gradually stamped out.[2]

According to the law of exercise, the spider should have learned to drop from the web at the sound of the

[1] William James, *Psychology*, Vol. I, p. 127.

[2] A. I. Gates, *Psychology for Students of Education* (Macmillan Company), p. 224.

tuning fork, for that was the act which it was practicing. On the contrary, however, it learned *not* to drop. Another illustration of the same thing is found in that classic of children's literature, *Black Beauty*. As the last step in his training, the colt, Black Beauty, was placed in a pasture beside which ran a railroad track. The first time he saw the roaring, puffing monster with its long tail of clattering cars go rushing by, the colt rushed in wild terror to the opposite side of the pasture. The next time a train passed, he again galloped away, but without the same violence of fear. After a week or two, he learned to pay no attention to the train, but to continue feeding quietly in the pasture. Again the law of exercise is apparently at fault, for the function in which Black Beauty was receiving practice was that of running away.

Another phase in this apparent inconsistency in the law of exercise is familiar to any one who has learned to play tennis. If we always learned to do only what we do in practice, then it would be impossible ever to learn any new stroke in the game because one's first attempts are sure to be wrong ten times as often as they are right. One is actually practicing a wrong execution of the stroke instead of a correct one. Yet one does learn new strokes in tennis.

The explanation of these seeming discrepancies is found in another law of learning which we may perceive if we consider the attitude of the learner. In the case of the spider the process of dropping from his web was an annoying one, and he ceased to do it. Running away when he was busy feeding was annoying to Black Beauty. On the other hand, the stroke

which the tennis player learns is the one with which he is satisfied. Satisfaction and annoyance, therefore, are the limiting factors in the operation of the law of exercise, and are expressed in another law, the *Law of Effect*. This states that: "The individual tends to repeat and learn quickly those reactions which are accompanied or followed by a satisfying state of affairs. The individual tends not to repeat or learn quickly those reactions which are accompanied or followed by an annoying state of affairs."[1]

Every teacher uses this law daily in his classroom. He tries through rebukes and expressions of disapproval to give his pupils a feeling of annoyance when they make mistakes either in their conduct or in their studies, and through praise and encouragement gives the class a feeling of the connection of satisfaction with correct behavior.

**How the law of readiness is related to the law of effect.** One is faced, however, with a most difficult problem in connection with this principle. If learning takes place most efficiently and surely where the learner is pleased with results, must we teach only what is likely to be enjoyable to the child? Must we scatter his educational path with roses and never have him do what is not pleasing to him? The law of effect apparently leads us into commending a type of "soft pedagogy" which makes the educational process one of wandering pleasantly in Elysian fields of fragrant asphodel. Should nothing hard or unpleasant enter here that makes learning slow or impossible?

[1] A. I. Gates, *Psychology for Students of Education* (Macmillan Company), p. 230.

One cannot deny that such a position has been taken either avowedly or tacitly by some very radical schools where the children are free from teacher control, and follow only their own desires. But the fact is that such a point of view either ignores or else interprets in a most restricted fashion the remaining law of learning. A thoughtful interpretation of this law not only makes untenable the position described above, but also aids the teacher who wants to apply the law of effect in an efficient way and who, at the same time, must govern his teaching by reference to curricula and established standards of attainment.

The third law is an answer to the questions: What will prove satisfying to a child and what annoying? How can a teacher know beforehand whether a given piece of work will apply efficiently the law of effect?

We have already indicated that the law of effect has to do with the attitude of the learner toward the work he is doing. Since the remaining law, referred to above, conditions the law of effect, it also must concern the attitudes. But, whereas the law of effect refers to attitude *after* the learning has taken place, the final law of learning refers to that *before* learning. It deals with the impulses of the learner and his feeling toward the task before him. In general, if his impulse is toward the work, if his feeling regarding it is favorable, then he will be satisfied to do it; if the feeling is unfavorable, then he will be annoyed.

To return to the cat and cage experiment, confinement was irksome, and the fish outside the crate was tempting. Therefore, the cat's impulses were all toward escape, and satisfaction in success was the

result. In the case of the spider, its impulses were all toward remaining quietly in its web, and so it was annoyed at dropping.

We have all observed the workings of this law in the conduct of children. If one offers a dime to a boy for carrying a suitcase, the operation of the law is most evident. If there is a candy store in the vicinity, where the dime may be put to instant and satisfying use, and if the suitcase is not too heavy, the boy's impulses are all toward carrying it, and the reward of the dime produces a satisfying end to the work. If the suitcase is too heavy, or the day too warm, or if the boy already has a bag of candy, no impulse toward exertion is apparent. If, on the other hand, the impulses of the boy are aroused and then he is suddenly prevented from doing the task and acquiring the coveted dime, distinct irritation and annoyance are the results.

The psychological explanation of impulses is a battleground of debate at the present time. We shall not try to state in full the opposing points of view, for to the teacher's practical task of teaching school they would appear to be of little moment. Thorndike's explanation is, perhaps, the simplest and most useful to the teacher. He believes that whether or not we have an impulse to do a certain thing depends on a state of readiness or unreadiness in the nervous system—in the neurones themselves. How to secure these states of readiness for desirable acts and unreadiness for undesirable acts is a practical problem, consideration of which we shall reserve for Chapter VI. It is important to remember, however, that they

are of supreme importance in the teaching process because of their vital connection with the efficiency of learning activities through their bearing on the law of effect.

The third law of learning, then, takes its name from the fact that it describes the conditions of the neurones before the learning activity, and is called the *Law of Readiness.* In Thorndike's statement of it, which follows, the expression "conduction unit" simply means the sort of organized series of bonds or neurones described on page 14.

"When a conduction unit is ready to conduct, conduction by it is satisfying. For a conduction unit ready to conduct not to conduct is annoying. When a conduction unit unready for conduction is forced to conduct, conduction by it is annoying."

Diagrammatically it may be represented thus:

| State of Neurones *(Readiness)* | Activity *(Exercise)* | Result *(Effect)* |
|---|---|---|
| Readiness to Act | Acting | Satisfaction |
| Readiness to Act | Not acting | Annoyance |
| Unreadiness to Act | Acting | Annoyance |

The three laws of learning have not been described in this chapter in the order in which they actually operate. Since readiness precedes the learning activity, it obviously stands first in point of time. But at first the writer had great difficulty with his psychology classes in distinguishing between readiness and effect, and he finally worked out their relationship as described above.

**Summary.** All learning may be explained psychologically by the operation of three laws. The first of

these concerns the necessity of repetition for learning. The second states the well recognized fact that satisfaction with one's learning activities makes them more efficient, while annoyance retards or stops them. Finally, the third law states that whether satisfaction or annoyance follows learning depends on the impulses of the learner before beginning the work.

### Study Exercises

A class of eighth grade children wanted to produce a play for their graduation exercises. They met after school, decided on their play, and began to think about the parts each should take. They then took their plans to the teacher. She did not like the play; thought it too difficult for the children and so forbade them to give it. The children fussed so much that she refused to let them give a play at all, saying that it took too much time from their studies anyway.

1. Was this teacher consciously applying the laws of learning? Justify your answer.

2. What happened to the aroused mental activity in the pupils concerning the play? Is this harmful? State your answer in terms of the law of learning that was most violated.

3. Do you consider that this teacher made proper effort to have the children see her point of view? Should she have done so?

4. The teacher seemed to be concerned largely with having enough time to devote to "studies." Do you see an opportunity to improve these "studies" through allowing the children to produce a play? Are there possibilities for desirable repetitions in connection with a play?

5. What ability would the children have to have in order to choose a better play?

6. Judgment, the ability to choose wisely, and such traits are learned just as are skills, and the learning follows the same

laws. Do you see how this teacher might have managed so that the children would exercise judgment and thus be more able to select plays in the future?

7. What bonds *did* these children really exercise?

8. Outline clearly the three phases in this situation, as follows:

There was readiness for.....
There was exercise in.....
The resulting effect was.....

The following are statements of poor classroom procedure. Tell in each case which law of learning is most violated. In any case can you single out one of the laws alone which is disregarded? Do you find the three laws concerned in varying degrees in each case?

1. Keeping a child after school to do the spelling he missed during the day.

2. Having children read only one primer and one first reader in the first grade.

3. Making a kindergarten child stop painting a picture of a fire he had just seen to play a ring game.

4. Having a child write fifty times, "I have been a bad boy."

5. Teaching multiplication tables in the first grade.

6. Requiring seventh grade boys to write a poem about spring.

7. Writing on the board the mistakes made in an arithmetic lesson.

8. Teaching children to spell all the words they do not know in a reading lesson.

9. Giving second grade children arithmetic examples whose answers they have to get by counting on their fingers.

10. Having for a half hour a day in the fourth grade, long examples in oral arithmetic at very rapid speed.

## CHAPTER III

## HUMANIZING THE LAWS OF LEARNING

**The laws of learning as a reasonable interpretation of teaching.** We have mentioned the fact that the discovery of the laws of learning is a very recent one; the modern movement in psychology is indeed but little more than a quarter of a century old. Naturally there are many questions regarding mental activity which are unsettled, and the student of education is today confronted not by *a* psychology but by psychologies. The laws of learning described in the previous chapter are not accepted by many psychologists in the same way as Thorndike first stated them. We have suggested that the law of readiness is a veritable psychological battlefield; and the law of effect is capable of wide differences of interpretation. One may well ask, then, whether it is worth while to base any teaching procedure on such debatable ground.

The writer's answer is that the attacks on the laws as stated by Thorndike are from the standpoint of the technical psychologist, and not from that of the practitioner in education; namely, the teacher. The teacher does not really care whether readiness produces an actual physiological condition of the neurones, or whether satisfaction brings about a real chemical change in the brain cells. The question to him is one not of pure, but of applied science; not, is the Thorndike explanation one hundred per cent scientific, but does it work in the classroom?

From this standpoint the laws as described appeal to the teacher of practical experience as being sound. They are *good* explanations of how learning takes place. Every teacher knows that if children really want to do a thing they will do it better than otherwise and with more satisfaction to themselves. He also knows that repetition is the foundation of learning, and that repetition preceded by desire and followed by satisfaction is more efficient than repetition preceded by aversion and followed by annoyance. The teacher, then, or the practical student of classroom activities, may well leave to the expert in pure psychology, technical doubts as to the scientific accuracy of the Thorndike statement of the laws, and may accept them as usable explanations of the learning process.

The usableness of the laws lies in the fact that they break up the total teaching process into smaller units for thought and study. The need for such a procedure in dealing with such complicated matters as teaching and learning is obvious. One can examine the stages of a process more easily than he can its totality.

It is one thing to discover a law; it is quite a different thing to interpret it. Newton discovered the law of gravitation; but the airplane designer interprets it in ways of which the discoverer never dreamed. Merely because a law lends itself to simplicity of statement, one must not draw the conclusion that it is also simple of interpretation and application.

**The limitations of the psychologist's statement of the laws.** The laws of learning as stated by Thorn-

dike and his followers have about them an engaging simplicity which would seem to make teaching an easy process. Obviously the thing to do is to make children desirous of performing those activities which lead to the needed learning, make them repeat these activities again and again, and then reward the learners for good learning or punish them for poor. This is exactly what the experimenters did with animals when the laws were discovered. The fish outside the puzzle box and the unpleasantness of confinement procured readiness for the kitten's escape; his repeated clawings and scratchings constituted exercise; while the relief from confinement and the reward of the fish applied the law of effect.

As a boy, I had a friend who received a dime from his father every time he learned a psalm from the Bible. The proffer of the dime furnished readiness, repetitions of the words of the psalm constituted exercise, and the presentation of the coin after proof of learning brought about a satisfying effect. The laws are apparently perfectly applied; yet how many of us would justify this method as a good teaching procedure?

I recently visited a school where perfect marks in spelling for a week entitled the pupil to be dismissed an hour earlier than the others on Friday afternoon. Readiness—exercise—effect; but was it good teaching?

The difficulty, of course, lies in the fact that when we deal with a child we are dealing with a far more complex organism than a kitten or a spider; moreover, the environment for which we are preparing him

through school training is a far more complex one than faces the animal. And, finally, geography, history, arithmetic, English, and so on are not so easily divisible into units for learning as is escaping from a puzzle box or finding a way through a maze.

One of my colleagues has frequently made the statement that in education today we are suffering from an overdose of animal psychology. By this he does not mean that he fails to recognize the service of experiments with animals in teaching us the laws of human learning. But he does mean that after discovering the laws we have given them an animal rather than a human interpretation. Readiness has too frequently been secured by promises of rewards and punishments which are on the animal rather than on the human level; learning activities have been too much the aimless biting-clawing-scratching, treadmill-squirrel-cage type rather than the productive, creative thinking type; and satisfaction has been of the brutish sort to correspond with the low level of the readiness. It is thus entirely possible for a teacher to apply the laws of learning daily in his classroom and still violate every principle of teaching which modern education holds dear.

The laws of learning, then, carry no inherent assurance of good results. They are, indeed, useless to the person who will not give them a richness of interpretation which should characterize a discussion of how boys and girls learn geography, history, and arithmetic in the classroom. In *Guy Mannering,* Sir Walter Scott says, "Law's like laudanum; it's much more

easy to use it as a quack does, than to learn to apply it like a physician."

**How human learning differs from animal.** In learning to apply the laws of learning like a physician rather than like a quack, there are three important considerations which must be borne in mind in which human learning differs from animal.

The first of these is concerned with the fact that in school, children are not only learning certain facts and techniques, but they are also learning *how to learn.* One does not expect that animals will do more than learn certain stunts or tricks. They are not expected to develop attitudes toward work, toward accomplishment, or toward improvement in mental functions. In training an animal, no effort is expended in attempting to teach it to "take a problem-solving attitude," or to learn to concentrate on a new task.

"Training in *methods* of memorizing, acquiring skills, solving problems, and in maintaining proper attitudes is an important task in education, as well as the mere accumulation of information and skill."[1]

I was talking recently with the head of a large textile manufacturing plant about the problems of running his factory. "You school people know how to teach facts pretty well," he said, "but you fail to give your pupils the kind of training I want most in my employees. They are mentally lazy; they are running on mental momentum too much of the time. They have no initiative, no imagination."

[1] A. I. Gates, *Psychology for Students of Education* (Macmillan Company), p. 370.

The real trouble with too many adults is not so much mental laziness as a lack of sensitiveness to problems which need study and thought. A cornered animal will show surprising vigor and resourcefulness of reaction; so will a cornered human being. But what is needed in a democracy is a host of men and women who do not wait to be cornered to use their minds. In business, politics, law, medicine, and personal affairs, progress requires people who are capable not only of thinking in an emergency but who are also sensitive to potential problems, the solution of which will bring advance.

The trouble has been that we have thought of school life too much as a cramming process during which the children were to be furnished with all the facts and abilities they would need later; and we have had a confidence that such knowledge would be relatively permanent and usable in all situations. For such confidence modern psychology gives little basis. Moreover, we are now living in so changing a world that what is true today may be false tomorrow. The only hope for permanent improvement in our civilization is a body of citizens who have not only accumulated a wealth of facts and skills, but who have also learned how to diagnose, analyze, and solve their own and the world's problems—in other words, men and women who have learned how to learn and to apply their learning.

The second difference between human and animal psychology is found in the greater fertility of the human mind in the use of ideas or mental imagery. The shortcomings of the animal mind may be well

illustrated by an experiment which was tried with birds outside a large wire cage. A small hole was made in a corner of the cage, and grain was sprinkled inside. The birds, attracted by the sight of the grain, fluttered about the cage and eventually found their way inside. Once within, they had considerable difficulty in finding their way out again, indulging in the same sort of promiscuous fluttering about as characterized their attempts to enter. After several days, however, the birds learned through practice to fly in and out of the hole without difficulty. Then the experimenter closed the hole and opened another in another corner. It took the birds just as long to learn to fly in and out of the second hole as it did the first.

Learning of any sort has in it a large element of trial and error. But with animals the trials are real physical trials, whereas human beings, through the use of mental images, perform many of their trials mentally. For instance, in the above illustration a man would have said to himself, "There was a hole in the netting before. That hole is closed. Perhaps now there is another hole. I shall look and see. Ah, there it is in the other corner!"

In this case, the man used his memory of the previous situation, which existed in his mind as a mental image, and then, instead of beating each part of the cage with his hand, he used his eyes and found the hole by making his trials mentally.

The distinction between actual physical manipulation of real things and mental manipulation of ideas is well illustrated in the following:

An old peasant woman of the hills of Fauglia near Pisa,

where I often used to stay, owed me twelve francs that had been given her the previous day to hand to me; I owed her seven francs for expenses she had incurred for me in the morning. "So you owe me only five francs," I remarked. But she was not very convinced. She began to count on the table twelve franc pieces: "There are your twelve franc pieces," she said to me, "now give me my seven francs." I counted her seven francs and it was only then she was convinced that our accounts were completely in order.

Totally different as these two methods appear at first sight, they are only different in that the poor woman found it necessary actually to perform all of the operations of counting, whereas I had performed them mentally, because I knew the final result experimentally.

I mislay my umbrella, and ask myself whether I have not left it in one of the places where I had to stop this morning. But I recollect that it has not ceased raining the whole morning, so at once reason thus: It is impossible that I returned home without my umbrella; otherwise I should have been drenched; which did not happen, as I had no need to change my clothes.

Here my reasoning consists solely in the fact that I imagine myself running through the street in the rain without an umbrella. This experience, occurring in thought alone, results, as I already know, in a certain state of my clothes (drenched clothes) which is different from what was actually the case.[1]

In the use of oral and written speech, man has, moreover, learned how to communicate these ideas to others. We can state a question in arithmetic about a problem of a storekeeper in such a way that a child may visualize the entire situation, decide what to do, and then do it as if all the various elements in the

[1] Eugenio Rignano, *The Psychology of Reasoning* (Harcourt, Brace & Company), translation, p. 72.

situation were actually present to his senses. The law of exercise as applied to boys and girls means to a large degree mental movements rather than physical. This, of course, immensely complicates the teaching process.

This second difference between human and animal learning, namely, that *the human mind utilizes mental imagery,* leads naturally to the third; which is that in the solution of mental problems boys and girls find their most efficient way of learning. "The sole direct path to enduring improvement in the methods of instruction and learning consists in centering upon the conditions which exact, promote, and test thinking. Thinking *is* the method of intelligent learning, of learning that employs and rewards mind."[1]

If one thinks of learning from the psychological standpoint, he will realize that this must be true. Psychologists insist that learning is reacting. In order to react, we must have something to which we react; and in mental work, the thing to which we react most completely and most whole-heartedly is not the external compulsion of the teacher's "You must," but the internal urge of finding an answer to a problem which interests and challenges us.

We have heard much in the last few years about the problem method in education. We speak of it frequently as if it were a definite thing, and many peculiar and silly things have been done in its name. The fact is that there is no such thing as *a* problem

[1] John Dewey, *Democracy and Education* (Macmillan Company), pp. 179-180.

method. What is really meant by the term is simply that school life should consist of a series of experiences, both direct and vicarious, presenting questions to which children will really want to know the answers.

In this matter we have frequently been led astray by the notion that problems must be broad and inclusive of much subject matter. We are told, for example, that the journey geography, which is characteristic of many third or fourth grade geography courses, is not problem study, but on the contrary that it is sharply distinguished from it. Now, this is a perversion of the facts. The children who are wondering what kind of imaginary clothes to take on their imaginary journeys, or what the inhabitants of the country they are visiting will look like, are engaged in problem study just as truly as are those who are struggling with the problem as to whether the United States got a good bargain when it purchased Alaska.

The important question, then, is not the scope or inclusiveness of problems, but how eagerly and decisively the children react to them. If learning is reacting, then one small question which evokes real mental enthusiasm from the children is worth a dozen which may be very broad but for which children have little affinity.

The probable difficulty in the whole matter is one to which we referred earlier; namely, that we have tried to mechanize psychological principle into a definite method. The essence of the situation is simply that whereas an animal learns by reacting physically

to a problem in his immediate environment, a child may learn by reacting mentally through ideas and imagery to a problem in his mental environment. The use of problems in school work has great value, then, in securing the same whole-heartedness of effort and vigor of reaction as characterized the attempts of the cat to escape from the cage.

**Summary.** Although they may, perhaps, be challenged on purely scientific grounds, the laws of learning present a usable explanation of learning. To be of value to the teacher, however, these laws must be interpreted in human rather than in animal terms. The chief differences between human and animal learning are: The child is not only learning facts, but he is also learning how to learn; children can use ideas and mental imagery in their learning; and therefore reacting should be, in school children, to a large degree a process of using ideas and mental imagery in the course of thinking.

### Study Exercises

In a study, *The Solving of Problem Situations by Pre-school Children,* Dr. Augusta Alpert describes the activities of pre-school children in solving the problem of how to get an object that was out of their reach. The child being tested was in a nursery pen from which he could not get out. An attractive toy dog was placed too far from the pen for him to reach it with his arm. A stick long enough to reach the dog was placed in the pen with the child. The object of the experiment was to determine if the child would discover the use of the stick and how long it would take him to do so. One child looked at the dog over the top of the pen and in 5 seconds began to look around; sat down and peered through the bars;

"I'll go out and get the dog in," he said, to which the Experimenter replied by shaking her head negatively. The child picked up the stick, looked at Experimenter, and very tentatively put the stick through the space, again looked at Experimenter, and drew stick in before it was half way out; placed it where he originally found it. The child tried to reach the dog with his hand through a space, saying, "It's too far," but continued to stretch for it; he tried to reach with the stick again, succeeded, and was thrilled when the toy was in his hand.[1]

1. Outline the readiness, exercise, and effect phases of this child's activities. Does all of his behavior fall clearly under these three heads?

2. Do you see an essential difference between the behavior of the child and the behavior of the kitten described on page 22? What, if any, difference is there?

3. In this illustration find an example of mental trial and error. Also find an example of physical trial and error. What proportion of each do you find?

4. Would you expect to find the same proportion of mental and physical trial and error the next time the child was in this situation? How might the proportion be changed?

5. Would you say this child was *thinking?* What evidence is there to support your answer?

6. What evidences of learning do you find? Would you call this one form of the problem method?

7. What difference in the learning would there have been if the Experimenter had *told* the child to use the stick? What essential of learning through problem solving is implied in your answer to this question?

8. The illustration given above is one of simple problem solution on the ability level of a pre-school child. Describe a situation in your own present life in which you had a problem to

[1] Augusta Alpert, *The Solving of Problem Situations by Pre-school Children* (Teachers College Bureau of Publications), quoted *ad lib* from p. 22.

solve comparable with this problem.* Tell how you went about solving it. You might use the following outline:

A. The rise of the problem to be solved.
B. Readiness—Why and how much I wanted to solve the problem.
C. Exercise—What I did to try to solve it.
    1. Physical trial and error.
    2. Mental trial and error.
D. Effect—Did the solution satisfy me?
    Am I now more ready or less ready to attack the same problem?
    Would I attack the same problem in exactly the same way another time?

* Be sure to use a simple instance of problem solving such as:
How I got in the house when I had lost my key.
How I got the top off a bottle without a bottle opener.
What I did when my automobile wouldn't start.

## CHAPTER IV

## READINESS IN THE CLASSROOM—GENERAL CONSIDERATIONS

**The present emphasis on enlisting children's readiness.** The reasons for which any of us do anything may be roughly divided into two categories: the first may be called *external compulsion;* the second, *internal compulsion.* In adult life all of us are compelled through physical fear, financial pressure, or desire for social approval to do some things which are either actively obnoxious or merely very distasteful. The same holds true in most schools, even though they may be of a progressive type. Complete freedom to do anything one wants to do within the range of his environment is possible only for a Robinson Crusoe.

There are, however, a great many things which even the most circumscribed person does which are done because he wants to do them. Of course many of these merge into external compulsions, and no clear line can be drawn between them. The extremes, however, as may be illustrated by the prisoner breaking stone as opposed to the small boy starting off for a Saturday morning swim, are readily recognizable.

Progressive schools have recognized that internal compulsion or pressure is far more likely to engage fuller mental absorption, and consequently produce more fruitful school experience than external compulsion. The movement to enlist the free and spontane-

ous effort of children, which began with Rousseau and Pestalozzi, has steadily gained ground until now we hear much of the necessity of stimulating the whole-hearted endeavor of children in their school tasks. We may not yet have discovered how to make learning the multiplication table or the necessary dates in history a labor of love for all children; but the trend toward a greater absorption of children's minds in the work they are doing is a most healthy one, and much has been achieved in that direction.

It is only natural that this movement should have produced new terms for this internal compulsion. The felt need, the inner urge, the whole-hearted purpose, the intrinsic interest, the mental drive—all these are names for this force within children which we hope to enlist in the cause of education.

In the terminology of the psychologist with which the reader is already familiar, the word readiness is used to describe this force. It would seem that this is a more satisfactory term than the others, for it is more inclusive and at the same time it is more accurately descriptive of the psychological condition of the learner during mental activity.

The vitally important rôle of readiness in the learning process has already been discussed. It has been brought out that satisfaction and dissatisfaction have a very definite effect on the efficiency of learning (Law of Effect, p. 27), and that these conditions are largely the result of the child's readiness or unreadiness for the task. It is obvious, then, that the question of how to obtain a condition of readiness is of paramount importance to the teacher.

Psychologists tell us that readiness is an actual condition of the neurones themselves, and that it has its roots in the native endowment of each individual human being. At birth the child may be said to have certain instinctive readinesses, such as those for manipulation with the hands and mouth, for sneezing, crying, sucking, or other bodily movements. Growth is, to a large degree, a process of acquiring readinesses for new reactions in response to new stimuli. Some psychologists, notably MacDougall,[1] claim that all forms of readiness in human beings have their beginnings in instinctive or unlearned tendencies.

Because of these facts we hear much in modern educational parlance of enlisting in any activity the "natural interests of children." Since this expression has today become so axiomatic in pedagogical discussions, it will pay us to examine it more closely.

**What are the "natural interests of children?"** From the moment of birth almost to the moment of death, a normal human being is learning. We recognize without question that this learning frequently takes place in the realm of facts and ideas. The age levels in our intelligence tests are a witness to this fact; for each age level more facts and ideas are expected than on the previous level.

Learning is always the result of the environment acting as a stimulus to which the individual reacts. This stimulus produces an impulse or a state of readiness to do something. Obviously, then, as one learns more facts and ideas, he is able to be stimulated by more and different sorts of situations, for his environ-

[1] William MacDougall, *Social Psychology*, p. 44.

ment is more fertile in possibilities of things he knows about and to which he can react. For example, a child is but little stimulated to react to a glacial boulder. He cannot push it, and it may be too high and too smooth for him to climb or sit upon. But a geologist has an entirely different reaction toward it; he studies its present position, evidences of wearing and weathering; and from these he draws certain conclusions.

From the above, it must follow, then, that states of readiness are themselves just as subject to learning as are the reactions which are practiced. When we learn that $2 \times 8 = 16$, we are also learning a certain readiness to react to the symbols 2 and 8 with a multiplication sign between them. It is the whole reaction that is learned. If by chance the failure to learn this combination has provoked a severe punishment, then, coupled with the fact that $2 \times 8 = 16$, may be a readiness to be emotionally upset by that combination.

*Interests are often learned reactions.* Returning to our question as to the meaning of "natural interests," we are confronted by the fact that *interests* are simply *states of readiness to react to certain stimuli.* Therefore, they are subject to learning. If one thinks of this statement for a moment, he will see it must be so. The interest of a child who has never seen or heard of an electric train is not stimulated by the words "electric train." But after he has seen and played with one, the words evoke instant interest on his part. He has *learned* to be interested in the words "electric train."

If all of the above be accepted as true, then certain important results for classroom method follow.

**The school should utilize both original interests and acquired interests.** During the entire period of a child's pre-school life his mental growth has been marked by a broadening of his experience and as a consequence by a widening of his circle of interests. As a result, when he enters school his instinctive forms of readiness have already been patterned into a mosaic of original and acquired interests. His original readiness for, or interest in, large bodily movements, for example, has been changed into an interest in playing with a ball; for manipulation, into the making of mud pies. Naturally this pattern of acquired interests continues to grow and change and is, therefore, much affected by the environment in which a child lives. A city child may be interested in subways and apartment house elevators, while a country child may be more interested in silos or threshing machines. It is not that a city child has a predisposition to be interested in the one sort of thing and a country child in the other; it is simply a matter of environment.

Of course, there are a large number of instinctive impulses or readinesses which are relatively common to all children. For a complete description of these the student should consult a modern textbook in psychology.[1] Gates' list of the possible classifications of such impulses and activities, some of which may be utilized in the schoolroom, is as follows:

[1] A. I. Gates, *Psychology for Students of Education* (Macmillan Company), Chap. VI; or E. L. Thorndike, *Educational Psychology* (Teachers College Bureau of Publications), Vol. I.

Instinctive Responses to Objects or Events in the Environment.

Gross bodily activities, such as walking and climbing.
Manipulation.
Vocalization—weeping, laughing.
Avoiding reactions.
Overcoming obstructions.
Mastery.
Fighting.
Submission.
Collecting and hoarding.

Instinctive Responses to the Presence and Activities of Other Human Beings.

Parental behavior.
Mating behavior.
Gregariousness.
Desire for social approval; avoidance of scorn.

Native Mental States.

Certain impulses.
Mental activity.
Curiosity.

Naturally, an experienced and thoughtful teacher is sufficiently familiar with basic child nature to note in this list traits of his own pupils which he has recognized and used again and again. In many classrooms, to be sure, there is still a great need to take them even more into account. But a good teacher knows, for example, that a child thoroughly enjoys competing with his own record or the records of others in certain skills, such as addition or spelling. This is simply a manifestation of the instinctive interest in mastery. He knows that collections of many sorts represent an instinctive interest of children which may be well

utilized for school purposes. He knows that it is unwise to keep children in a restricted position in their seats for long periods of time because such a procedure is opposed to the instinctive readiness for gross bodily activities. He knows that such things as modeling clay, tools, sand tables, paints, scissors, and paste, appeal to the child's natural interest in physical manipulation; just as the solution of puzzles and problems appeals to the natural interest in mental manipulation or activity.

As has been previously implied, all of the interests of children may doubtless be traced to the native interests in Gates' list. This list, however, is expressed in psychological generalities rather than in specific terms easily translatable into methods of treating the subject matter of the school curriculum. Since this is true, and since the original readinesses have been more or less completely reorganized through pre-school or extra-school learning, the statement that we should follow the "natural interests of children wherever they may lead" is a meaningless phrase except as noted above. It offers little concrete guidance to the classroom teacher to assist him in planning his work in geography, history, or arithmetic.

**The school should help children to widen their interests.** In connection with this topic of interest as a manifestation of readiness, another point should be noted. Since interests are subject to learning, it follows that it should be the duty and privilege of the school to develop interests in children. One of the big tasks of the school is not to *follow* the natural interests of children, but to *lead* them into new in-

terests whose fascination they might never have discovered for themselves. This conception dignifies the place of interest in school procedure; it is "not a mere tickling of the mind for transient ends,"[1] but is itself one of the most important aims. If we examine in our own minds the residuum of our school life, we shall, of course, recognize certain skills which abide permanently; we shall find certain facts—but alas; how few compared with the number we learned! How many of us would care to take an examination in any school subject which we are not now teaching or have not taught? But in this small residuum we may find some vital interests which have colored our whole lives. Even with all our emphasis today on objective testing of the knowledge of facts, the educational theorist does not deplore that the school has developed these interests; on the contrary, he deplores the paucity of their number in the schools of the past.

The son of one of my colleagues was at one time much interested in pond life. Father and son were one day making a field trip on the Palisades of the Hudson River; the boy armed with test tubes, and taking frequent samples of stagnant water for microscopic examination. The father was somewhat worried by the narrowness of the lad's interest, and he searched in the woods until he found a large, flat stone, partly imbedded in earth. Calling the boy to him, he turned over the stone. A little red salamander darted out into the leaves; ants rushed hither and thither carrying away fat white eggs; a couple of

[1] Charles De Garmo, *Herbart and the Herbartians*, p. 65.

earthworms quickly drew into their holes; and a "thousand-legger" hastily scuttled into his burrow. The boy's eyes grew big with interest; a new world had been opened to him.

The school must *turn over the flat stone* for its pupils in geography, in history, in arithmetic, in literature, in art, in science—in all the realms of human knowledge. If it fails to do this, it has failed to realize its opportunities.

**The school should help children to acquire new interests.** The third point now follows from the two previously made: Not only are interests learned reactions; not only is it the task of the school to broaden the children's interests; it must also teach the children how they themselves, may acquire new interests. We can all find among our acquaintances illustrations of those who have this ability and those who have not. I know some men whose interests have not appreciably changed in twenty years; I know others who have developed new interests every time I see them. This sensitiveness to possibilities of new interests is no doubt in part a matter of the original nature of the individual; but there is no evidence that it cannot be consciously developed; and common sense and knowledge of children would indicate that it can.

Educational theorists of the past thought of the mind as a storehouse with a limited capacity, and they warned children not to fill it with useless or with harmless matter. We know now that this conception is false; that no one has ever exhausted his mental possibilities for learning. But in this comforting re-

flection we are prone to forget that our interests are the directing factors of our minds, and that if our interests are narrow or base, we pay attention only to one line of facts or to facts of harmful significance.

On the other hand, we can cultivate in children a sensitiveness to interests of many sorts, so that their minds will reach out tentacles and fasten them to many and varied fields of thought; nor will they relinquish any such field until they feel that it no longer offers scope for their mental activity. If only we could keep alive in children the wonder of life and of the world, so that, like the old man in Galsworthy's *Ultima Thule,* even a buttercup, or a cat, or the scales on a fish are "really marvellous things!"

**Summary.** Modern education is deeply concerned with enlisting children's whole-hearted readiness in their school tasks. When we look for the sources of this readiness, however, confusion arises because of the fact that interests or forms of readiness often are themselves learned reactions. In the light of these considerations it is evident that the task of the school is: first, to broaden and expand children's interests, and, second, to teach them to acquire for themselves new interests or forms of readiness.

### Study Exercises

A fourth grade boy presented a problem in the teaching of reading. He did not seem to wish to read at all. He attended a progressive school and apparently had all the normal stimuli to read. Late in the term the class was discussing aviation. The boy seemed tremendously interested. The teacher discovered that he was an aviation enthusiast and that he was familiar

with the construction and workings of airplanes. She encouraged him to bring clippings about various aviation incidents which he kept in a scrap book. The teacher used every opportunity to have the boy read about airplanes. She later interested him in reading about other modes of travel. With this guidance he became interested in reading.

1. Discuss the values in this teacher's use of the boy's interest in aviation. What type of compulsion to read would you call this?

2. What connection do you see in this case between external stimuli and internal compulsion?

3. Why do you think the boy had not been very much interested in reading previous to this experience? What connection with reading readiness do you see here?

4. What conscious effort did this teacher make to expand the boy's interests? Discuss further means of expanding his interests beyond the point this account describes.

5. How near to his present interests should the teacher search for new ones? How long should a child be allowed to maintain a single interest? What natural process often makes it impossible for a single track interest to persist?

6. In what ways can the teacher help the boy develop habits of seeking new interests in life? What part does the law of effect necessarily play in your answer?

7. To what types of things in life are you particularly sensitive? How did you develop sensitiveness toward these types of things? What would you say is absolutely essential to the development of sensitiveness to any type of thing?

## CHAPTER V

## READINESS IN THE CLASSROOM—CRITERIA FOR JUDGING

**The bewildering number of possible interests.** As has been suggested by the previous chapter, *readiness* and *motive* are largely synonymous. Readiness is the psychological term; motive the pedagogical. Motive is a somewhat broader term, for under it we may include fear as a reason for certain actions; and fear usually connotes at least a measure of unreadiness. As a rule, however, when one discusses the motivation of school work he is talking about methods of securing a state of readiness in the neurones of the pupils.

It has already been established that the original equipment of children's instinctive drives to action furnishes a fertile field for sources of readiness. When a teacher suggests the collection of specimens of butterflies to start a nature study museum, he is appealing to the collecting instinct in his pupils, and a favorable response is almost certainly assured. When he posts a graph of daily spelling marks for each pupil, he is appealing to the instinctive impulse toward mastery. It is the duty of every teacher to be familiar with the instinctive equipment of children, and to consider it carefully in planning his work.

The bewildering thing about planning for motives to which one may appeal in the classroom, however, is the infinite variety of forms of readiness which are

possible. Fear, self-respect, competition, cooperation, acquisitiveness, physical movement, and many others may be and have been translated into a multitude of devices, games, schemes, and special methods. All of them are not equally good; we must have some criteria by which to judge their worth or we are hopelessly lost in a tangle of possibilities. It is not enough to say that we shall follow the natural interests of children, for *all* of the above are based on some instinctive tendency. Even the threat of corporal punishment derives its force from the instinctive equipment of children, but no one would defend it as a desirable form of motivation.

**The first criterion for readiness.** The establishment in the previous chapter of the idea that in the school children learn not only facts but also interests or forms of readiness, gives us the clue to the criteria of worth of motives. Since it is the business of the school to prepare children for life, and since it is possible to teach children to respond to new interests or motives, it must follow that the first criterion for the selection of desirable types of readiness is found in the answer to this question: Does the motive to which I am appealing function largely in a productive way in adult life?

To see how this criterion works, let us take as an example the type of teacher who usually appeals to the love of his personal praise as a motive. Immediately we must conclude that his work is at fault, however high the scores of his pupils may be on standard tests; for the children are learning to work only when immediate praise accompanies satisfactory

efforts. Such is not usually the situation in the office of the doctor, the lawyer, or the business man. The individual who has learned to work only for praise is likely to be sorely disappointed and disillusioned before he has gone far in any vocation he may choose. Praise does come to most of us at times, of course, but not frequently; and we must be able to work long periods without it.

As another illustration of the value of the criterion we are discussing, consider the teacher who always uses some form of external compulsion as a motive. This does obtain later in life, to be sure. We all have to do things we do not want to do, the neglect of which would lose us our positions. But no great success or happiness has ever been achieved by the time-server who does only what he is compelled to do. The motive of external compulsion does exist in adult life, to be sure; but the successful person is the one who feels it the least. It does not function in a productive way in the lives of men and women.

Another type of teacher will be found wanting on the basis of our first criterion: He is the one who always introduces some form of competition into his classroom method. The reason for doing any piece of work in his class is to beat the rest, or some of the rest of the children. I was in a classroom a few months ago where, in the space of an hour and a half, the teacher had the girls compete against the boys in exercises in reading, in arithmetic, and in spelling.

It is true that competition is present in adult life; but it is equally true that it is not a motive which has produced the best type of achievement. This has

come out of ideals of service and of cooperation. A spirit of ruthless competition may have produced an Alexander, or a Napoleon, but it could never have produced a Lincoln, an Edison, or a Madam Curie. Moreover, when we compete in adult life, we compete with those of similar interests and similar abilities; this is assured by the fact that competitors are in the same line of work. But in the elementary school—the school for all the children of all the people, where pupils vary widely in intelligence and in interests—we are creating, in establishing a spirit of competition, a situation which must produce a spirit of supercilious pride in some and of discouragement or despair in others.

We have previously referred to the use of the impulse for mastery as if it were a valuable and sound assistance in the classroom. Such is indeed the case, provided a child compete with his own record and learns to master himself. Even then it may well be used sparingly, for ideals of cooperation and of rendering a contribution to a group stand so much higher when judged by our first criterion.

**The second criterion for readiness.** Our second criterion for classroom readiness is a corollary of the first: If motive in the school should be of a type that obtains largely and in a productive way in later life, readiness ought also to be vitally connected with the subject matter itself, and thus be an essential part of its study. The common sense of this criterion is obvious if one remembers the point previously developed, that we are learning interests as well as subject matter in the school. If our pupils are to continue to

grow mentally in the fields of learning opened to them by school life, it follows that the motives or interests in studying them must be inextricably bound up in the subject matter, otherwise the interests they learn can never lead them into progressive future thinking in geography, history, arithmetic, literature, and other fields of learning.

This point is so important and so frequently forgotten in classroom practice that we may well pause for some illustrations. Sometime ago I was visiting a first grade reading class. The work for the first fifteen minutes was a drill on words which had been met in a story read the day before. The teacher began by asking the class whether they enjoyed throwing stones into the water. Of course they all did. Then she said they were to imagine they were on the big bridge at the amusement park near by, and that there were a number of stones beside them on the bridge, each with a word written on it. If they could give the word correctly, they could throw the imaginary stone off the imaginary bridge into the imaginary water. She then wrote the words on the blackboard and put a rough outline around each one to represent the stone. The children were called on for the words, and when a child gave a word correctly it was erased and he made a motion of throwing to show that the stone had been hurled into the water.

In view of our second criterion, comment on this lesson may well be brief. Interest in throwing stones has nothing whatever to do with calling words; the latter is not an end in itself but a means for getting thought. The real readiness for calling words cor-

rectly should, of course, lie in the desire to understand or communicate a story.

I saw another illustration of this same type of external readiness a few months ago in a second grade class. Again the subject for work was a word drill. This time the teacher gave a desk bell to one of the pupils and put the drill cards on the chalk rack of the blackboard. The pupil with the bell then called on another pupil, who took his place at one end of the blackboard and started to walk slowly toward the other end. At some time in his progress, the pupil with the bell rang it. The child at the blackboard stopped immediately, turned toward the chalk rack and attempted to give the word opposite which he had stopped. If he gave it correctly, he received the bell, called on another pupil, and the process was continued.

Here the teacher was appealing to a well recognized instinctive tendency—that which Gates calls "gross bodily movements." If our only criterion for readiness is that it should be founded on the original nature or natural interests of children, we would have to approve heartily of the procedure described. But the tendency to gross bodily movements has nothing whatever to do with learning to read words; in fact it is rather opposed to it. Apart, then, from the pitiful inefficiency of this lesson from the standpoint of drill —each child of the thirty in the class being tested on only one word in a thirty-minute period—it is hopelessly at variance with the criterion we are discussing; namely, that readiness should be vitally connected with the subject matter itself.

In contrast to the illustrations given, we are here reproducing a report of a lesson given by Miss Bonnie Mellinger in the Horace Mann School of Teachers College.

The class was seated in two rows in the front of the room. Miss Mellinger walked in front of them.

"Are we ready? We haven't had time so far to read all the poems you like. Have you any you want me to read to you now?"

Teacher sits down before pupils.

"Miss Mellinger, read *Jumblies.*"

"Yes, Miss Mellinger, that is what I wanted too." (Several voices.)

Miss Mellinger read the poem. The children joined in at any place where they knew a part.

"Who has another choice?" (Many hands up.)

"Susanne."

"I like the *Nonsense Rhyme.*"

"That is what I was going to say." (One voice.)

Miss Mellinger read the poem. The class joined at any place where they knew lines. Class showed appreciation by laughter at the end.

"Who has another poem?"

(One child): "I like that one about a cat."

(Title: *Where are You Going, My Little Cat?*)

"I was wondering if some one wouldn't choose that."

Miss Mellinger read the poem and the children joined when they could.

"I have a surprise for you. When you heard that poem before, some one said she had it in a book at home. This is the surprise. Would you all like to read this poem? I have made some copies. If you can read them, you may read them to Mrs. Meadowcroft's class; then, too, you

may take them home with you. Before I give you each a copy, I think I will see how many can read my copy."

Places chart before the class.

"Where are you going my little cat?
I am going to town to get me a hat.
What! a hat for a cat!
A cat get a hat!
Whoever yet saw a cat with a hat?"

Miss Mellinger ran her finger slowly along the lines. The class read in unison. One child was asked to read. Miss Mellinger ran her finger under lines slowly. Miss Mellinger and the class gave the words promptly when the reader hesitated. Paul read the chart. Katherine read it.

"If you all watch when some one is reading, that will help you. I can't give you a sheet to take home until you can read it."

Portia read.

"Who will come up and find 'I am going to get me a hat'?"

One pupil found it.

"Find 'What! a hat for a cat!' "

One pupil found it.

"Now show me 'cat.' "

Miss Mellinger read and ran finger under, "Whoever yet saw a cat with a hat?"

"Find 'cat.' "

Pupil touched "cat."

"Which is 'hat'?"

Pupil touched "hat."

"Let us notice the difference between 'hat' and 'cat.' It is just this first part you see."

"Who can find 'Whoever yet saw a cat with a hat'?"

"Mary, you try."

Mary stands before chart.

Miss Mellinger:

"Mary is thinking."

Miss Mellinger read the sentence again. Mary found it.

"Now I am thinking of a sentence. It is such a hard one. Shall I ask you for it?"

"Yes, yes." (Several voices.)

Miss Mellinger reads,

" 'What! a hat for a cat!' "

One pupil located it.

"Who can find 'little' in this line?"

Hands went up. Miss Mellinger pointed to the sentence and designated a child to find "little."

"Who can find 'cat' in this line?"

One child went up. Miss Mellinger pointed to the line. The child hesitated.

"See if she finds it, Leonard."

Leonard wasn't giving attention. Whole class was getting noisy.

"You are not helping her a bit. I couldn't think either unless you helped me."

Class became quieter.

"Who can find 'cat' in this line?"

A child located the word "cat."

"Good! That is fine."

"Who can find 'hat,' not 'cat' but 'hat'?"

Mary found it.

"Good, Mary. Can you find 'hat' in this line?"

Mary found it.

Miss Mellinger pointed.

"Can Mary find 'cat' in this line?"

Mary found it.

"Can Mary find 'hat' in this line?"

Mary found it.

"Let us all read the whole thing through."

Miss Mellinger ran finger slowly along the lines and the class read.

"Now is the hard line. Let us read it together. 'A cat get a hat!' "

Miss Mellinger ran finger along the line and the class read.

"When you take this poem home, you may not remember every word, but you will be able to read some of the lines, I know."

Miss Mellinger passed sheets containing these lines. As she was passing them, she said:

"If you can't read your poem, look at the chart and see if that helps you. If it doesn't, ask me. We must test out to find out who is to go to Mrs. Meadowcroft's room to read. It was nice, Joan, for you to wait so patiently for your sheet, since you are the last one to get a sheet."

Here again, this teacher is drilling to some degree on word recognition. But the motive for it is not some external stunt or game, but lies in the desire to read a given selection. In analyzing this motive we may distinguish two elements in it.

First, there is the sheer joy of mastery of a piece of mental work. This type of readiness is an aim in much of our elementary school teaching; it is general rather than peculiar to the sort of drill work in the lesson under discussion. Thorndike calls it "the general enjoyment of success rather than failure in an enterprise to which one has set oneself." In another place he calls it "the interest in achievement," and

states that it "is stronger in children than is often realized."[1]

This motive satisfies well both of our criteria. It is the sort which should function in a productive way and to a considerable degree in adult life, and it also is vitally connected with the subject matter. It is perhaps stronger in the first than in the second criterion.

The second source of readiness, on the other hand, is stronger in the second than in the first criterion, although it satisfies them both. It consists in the joy of sharing a reading experience with others, in this case with the parents of the children or with Mrs. Meadowcroft's class. Such a motive runs through adult life in the discussion of books, magazine articles, or newspapers; and it grows out of the subject matter since the enjoyment of the material leads to the wish to share this enjoyment with some one else.

There are some parts of the school curriculum which are exceedingly difficult to motivate so as to satisfy the second criterion which we are discussing. Spelling, number combinations, and the like are very hard to teach in such a way that readiness may be vitally connected with subject matter itself. In such cases it is undoubtedly proper to use such drill devices as number games, spelling matches, or location drills, where the motive is in the game rather than in the subject matter. Let us be sure to recognize, however, that these are lapses from the ideal; that they must

[1] E. L. Thorndike, *Psychology of Arithmetic* (Macmillan Company), p. 197.

be tolerated as little as possible to secure necessary mastery, and that perhaps some day we shall know enough about teaching to discard them. A man who is convalescing after having broken his leg would be a fool to refuse a crutch when he first starts to walk, simply because it is artificial and unnatural. But he would be equally foolish to continue to use the crutch after his leg had healed.

**Summary.** Because of the complexity of a child's original equipment of instincts and impulses, the teacher is faced with a bewildering array of possible sources of readiness. Some criteria, therefore, for judging the value of a specific form of readiness are desirable. Two important ones are: (1) Is the readiness of a type which functions largely and in a productive way in adult life; and (2) Is the readiness closely connected with the subject matter which is being studied?

### Study Exercises

"A crude drawing of a house is on the blackboard, with lurid flames and a cloud of smoke bursting from the window, a child at the window, and a ladder reaching from ground to window ledge. Figures are written on the rungs of the ladder, perhaps 2, 5, 4, 3, 6. The teacher says, 'Children, this house is on fire. Who wants to be a fireman? Who can run up this ladder in one minute and save the child who is about to be burned? All right, John, you may be the fireman. Hurry up, hurry up, the fire is getting worse.' And John is supposed to add the numbers with greater interest, speed and accuracy because of this exciting situation. If he makes a mistake, the child in the picture is lost, or another fireman must rush to the rescue."[1]

[1] A. E. Moore, *The Primary School* (Houghton Mifflin Company), p. 302.

1. What is the dominant motive of the children who are engaged in the activity described above?

2. Apply the criterion of function in adult life. In what ways do you find this activity failing to meet that criterion?

3. What would you say of the connection between the readiness and the subject matter? Which are the children most interested in: the game, or learning to do arithmetic well?

4. What connection do you see here with the law of exercise which states that we learn what we practice?

5. How necessary do you consider such a game device to be in the teaching of drill subjects? Does drill in arithmetic necessarily have to be so sugar-coated?

6. What are some of the probable attitudes that are being practiced in this activity?

7. Would you rule out all drill games?

8. Describe an instance in which children would be "ready" for drill in arithmetic through seeing its needs in relation to a vital activity. Note page 111 for an illustration.

## CHAPTER VI

## READINESS IN THE CLASSROOM—SOURCES

**Readiness may be secured through setting the stage.** In the preceding chapter we discussed the question of how to judge the worth of forms of classroom readiness, but we did not consider the question of how to get it. Every teacher is confronted with this problem upon approaching any new topic in any subject. It is, therefore, vitally important that he be given guidance in the matter.

The first method which may be used in accomplishing this may be called manipulating the environment in the classroom, or setting the stage in such a way that the desire to study the next topic grows in the children. The particular method of doing this varies indefinitely according to the material, but the teacher may well ask himself, "What situation might occur which would make *me* want to study this topic?" On the basis of the answer to this question he may set the stage in the classroom to approximate the conditions decided upon.

An excellent illustration of how a skillful teacher accomplished this is given in the following description:

About a week before the subject of France was reached in the study of Europe, the teacher brought to school a group of photographs which she had collected during the previous summer in a tour of France. One morning as the children entered the

classroom, they found the teacher busily engaged in pasting these pictures in a travel book. They gathered around her and asked about the work she was doing. She explained to them that she was making a permanent record of her trip and showed them her plan of organization or arrangement of the pictures. Much interested in the idea, the children asked if they might make a travel book something like the teacher's. A number of them had war pictures of France, and others had received postcards from relatives who were traveling in France. The teacher said that she was perfectly willing for them to follow up the idea, but they would have to take much of the responsibility on themselves. The class then suggested that they elect a committee to make a plan to be followed in working out this book. The committee was selected, met with the teacher after school, and worked out the plan that it thought best to follow. The teacher made suggestions occasionally, but the final plan was, in the main, the work of the children. The next day the plan was presented to the children by the chairman of the committee and was changed in a few minor respects. The children now, by readings and reports, and by working together on maps, etc., brought before the class the main points about France. After each day's work it was decided what was to go in the travel book. After four weeks' time the class had covered fairly well all the important topics on France and each one had prepared a travel book. Every child had a clear picture of the life and customs of the French people. The facts learned in this class were being used in other classes,

and there was considerable evidence that the work covered had given them a good working knowledge of the important information they needed about France. The drill work, necessary to fix the facts the children considered important, was a regular part of each day's procedure.[1]

There is no question whatever of the fact that this is good teaching. Through a carefully planned process of manipulating the environment, or setting the stage, this teacher brought into existence a purpose on the part of the children which she knew would be productive of excellent study and learning results. The teacher used the fact that she had had an interesting experience to induce a desire for an approximation of the experience in the children's lives.

Of a similar sort are the purposes stimulated by the teacher through bringing into the classroom reflections of unusual events or situations in national or world affairs. Recent airplane achievements or flights of discovery form excellent backgrounds for setting the stage for studying geography, science, or certain phases of arithmetic. Discoveries of historical import or anniversaries of great events lead naturally into history study projects. National calamities or distant events of world-wide importance make splendid possibilities for good geography or language work. Any teacher who fails to utilize to their full value any of the above which may occur is neglecting a fruitful and natural source of readiness in the classroom.

*The limitations of this method.* The question

[1] Adapted from the *First Yearbook* of the National Conference on Educational Method, p. 184.

naturally arises, however, as to how the teacher in the detailed illustration given above would have approached France if she had not happened to have been there the summer before. Suppose, moreover, that a country which is assigned to a geography class by the curriculum of a given year has had no conspicuous calamity, nor success, nor any unusual event. A colleague of mine has often remarked that thousands of geography teachers all over the United States heaved a sigh of relief several years ago when the earthquake occurred in Japan because they knew they would have to teach Japan that year, and the earthquake made such an admirable beginning for a Japan project. Obviously, however, we cannot wait until there is another earthquake there before we teach Japan again.

The trouble is that most of the conspicuously good recitations which have been described in books and educational journals are of the sort we have been describing; that is, world, national, or local life sets the stage for the study on a large scale, and the classroom teacher reproduces through discussion, pictures, newspaper articles, and so on, the same sort of stage setting on a small scale in the classroom. Such work is spectacular and impressive, but when teachers have been adjured to go and do likewise, and when they have been faced with what seemed a hopelessly prosaic topic in arithmetic, history, or geography, they have been at a loss to know what to do.

We have had a persistent feeling in modern education, however, that the teacher *must* set the stage in some way, and that this stage setting must grow

out of the lives of the children. As a result we sometimes have had really absurd situations in classrooms where the teacher has tried to lead children to study the next topic, through elaborate attempts to make them decide to do what he has wanted them to do. Recently, I heard a teacher describe how he induced his class to study about coal. He brought in newspaper clippings and put them on the bulletin board; he brought up the question of coal incidentally in his other class work; he placed pictures of coal mines on the reference table and induced the librarian to steer the class toward stereographs of the coal industry during the library period. Then he described his unutterable joy and relief when one day a child actually suggested that they make coal their next topic of study, and the rest of the class agreed.

This is all rather silly. I am always suspicious when in descriptions of educational procedure I read the phrase, "By skillful questioning, the teacher led the children to decide." The chances are the teacher wasted much valuable time, both for her and the class, in trying to drag out of the children suggestions for doing something which she had already decided they should do. Moreover, children are not long fooled by such a procedure. They very soon come to realize that any new topic must be preceded by a sort of guessing game in which they try to guess what it is the teacher wants them to decide to do. Being as a rule good sports, they enter into the task gravely, but one wonders whether they do not often laugh up their sleeves when complimented by the teacher for their "good thinking."

*The readiness of adults.* The question still remains, however, as to what should be done to place children in a state of readiness when no natural and easy approaches such as were described at the beginning of this chapter exist. For the answer to this question we will do well to think of the situations in adult life when study occurs, for there we will find a clue for classroom readiness. If children are learning how to learn, then they should be learning the kind of sensitiveness to the need for study which will hold throughout their lives.

Let us consider, for example, the case of a doctor. A patient comes to him with a peculiar complaint, and after a careful examination of the patient and a cataloging of his symptoms the doctor studies the case in order to arrive at the diagnosis and plan of treatment. In the course of this study, much reading of medical books or journals will probably be necessary. Here we have a similar situation to that of a child in the classroom of the teacher who induced her pupils to study France.

The needs of the patient in the case of the doctor, the skillful manipulation of the environment by the teacher in the case of the child, prompted the study activities. Good study on the project in hand was the result in each case. But let us note that in both cases the stimulus to study came from an external source. Neither the physician nor the child learned how to find readiness for study independently of external pressure.

The interesting fact remains, however, that no one would trust a physician who studied *only* when con-

fronted with a difficult case. Any doctor who "keeps up" in his profession is conversant with the newest books in his field and with the latest discoveries as described in medical magazines and journals. There is no external pressure for this, except the vague one of keeping abreast of the times. Such general reading may start with a mere cursory skimming of the reading matter. But the doctor is nevertheless sensitive to topics or ideas which may be of importance to his practice or which may be of general interest to him in his "irresponsible rumination of the material in one's own way which is the soul of culture."[1] When he finds such a topic, he reads the material with minute care and may consult other books and authorities on the subject. The impulse to read such books and to be sensitive to such interests lies within the doctor's mind, not in the external world about him.

Consider the study done by a successful lawyer. He works with the most meticulous care to array the necessary legal authority for his brief in a case under consideration. Again this is the result of external pressure; the client brought the case to him. But a lawyer also must "keep up" with his profession; he must know of recent books on theory and practice and of recent legal decisions which may affect future clients. He, too, follows certain trends of study with minute care, the study purpose growing out of his sensitiveness to stimuli in his general reading.

The business man studies the methods and ma-

[1] William James, in his introduction to E. L. Thorndike's *Elements of Psychology.*

terials of his competitors in order to meet the one and improve on the other. External pressure is again responsible. But once again he also studies the newspapers, business magazines, and frequently history or geography in order to improve his plant, or its output, or in order to expand his business interests.

The point we are making is that the child who learns to study *only* when the teacher has manipulated the environment or set the stage in such a way that his study purpose is extraneously induced and is the beginning point of the study, is not being fully prepared for the needs of adulthood. Life does not always set the stage in such a way that incentives to good study are constantly present. As we have previously pointed out, sensitiveness to study problems is one of the clearest indications of the results of good teaching.

From our illustrations of the study needs of adults, then, it would seem clear that we must teach children to approach a topic or a section of a book with a rather vague consciousness of its worth to them, and then lead them to find study purposes in the subject matter itself. This is the sort of thing children must learn to do if they are to be successful in later life.

**Readiness may be secured through plunging children into subject matter.** The answer to our question, then, as to the second source of readiness in the classroom seems clear. It consists in having the children engage in an interesting activity within their experience and then in inducing them to look consciously for study questions and purposes in this

activity. It is just as important to teach children to study to find a problem as it is to teach them to study to find the answer to a problem.

Some illustrations of how this may be done will be helpful at this point. Let us suppose that a group of children in the sixth grade were taking up the study of France. Unlike the teacher previously referred to, the teacher of this class had never been to France. No conspicuous events had occurred in France recently, so that the country occupied no more than the usual moderate attention in the newspapers and magazines. Life, therefore, had not set the stage for the study of the country.

Shortly before the teacher was to begin her study of France, she began to consider definitely the question of how to induce readiness on the part of the children. She asked herself, "What would make *me* want to study France?" She recognized first that talking with some one from France would act as a source of readiness. Although in some classrooms it would be quite possible to secure easily some one who had been in France to discuss the question with the children, in this particular instance no such person was available. Thinking farther, the teacher realized that looking at pictures of France or reading interesting material about it would serve as a source of readiness. At the first meeting of the geography class which was devoted to the study of France the teacher told them to open their books to page 306. Then she spoke to them somewhat as follows: "Our next topic is France. Have any of you ever been there?" There was no response.

"Well," she went on, "let us look over the material in our geography textbooks. You see it runs from page 306 to page 317. Let us look over the pictures and see what we find there which looks as though it might be interesting." There were eleven pictures in the text. The titles of them were as follows: (1) French Canal Boats, (2) Brest (the picture showed part of the harbor with boats and anchors), (3) A Scene in The Devasted Area of France, (4) An Airplane View of The Opera, Paris, (5) Nice, (6) A Village Scene in France, (7) Strasbourg (a view of quaint houses and a canal in the foreground), (8) Saarburg, on the Saar River, (9) The Bourse (Stock Exchange), Lyon, (10) Limoges (view of the city with an ancient bridge over a river in the background), and (11) The Harbor at Marseille.

The children looked these pictures over with the teacher, commenting on the points of interest which they saw in them. They were particularly interested in the picture showing the effects of the War in France and in the one showing a village scene in France. In the latter the foreground is occupied by a group of peasants with an ox team. In the background is an ancient stone house with a thatched roof. Being city children, this group had little notion of the use of oxen and were much interested in the few details given by the teacher. In discussion the teacher called attention to the fact that in many of the pictures, water transportation seemed to be prominent. Then she suggested that they start the reading of the text. Before proceeding, however, she made the statement, "Our textbook tells us some very interesting things

about France. The author, however, did not know all of the things which we might be interested in, and he could not put many interesting details in his book because of lack of space. While we read, I want you to keep this question in mind: What would I like to know about France which the book does not tell me? Whenever you have a question of this sort to ask, let us know and we shall write it down for further study."

The teacher then asked them to read silently the first paragraph, which is as follows:

Advantages of France for commerce.—France is better situated for commerce than Great Britain. It is as near the center of the active world as England; its coast line on the Atlantic puts it in close touch with America; and its Mediterranean coast brings it much nearer than England to the many peoples bordering on that sea. On its land frontiers it touches six other countries, which have an unusual variety of products and demands; and the fact that it forms the neck for the Iberian Peninsula makes it an important region for commerce by land between the Mediterranean and the Atlantic.[1]

When the children had finished reading, the teacher said, "Now, what do you suggest our doing to understand this paragraph better?" It was suggested immediately by the children that they should consult a map to check the statements of the text about the position of France and to look up the countries which border on it. This was done, and some little time was spent in fixing the position of France in the minds of the children. Then they read the next paragraph, which was as follows:

Figure 310 shows how extensively these advantages of posi-

[1] McMurry-Parkins, *Advanced Geography*.

tion have been improved. Trace the four large rivers, the Seine, Loire, Garonne, and Rhone, and note how they are connected by canals. Show how freight can go by water from Marseille to Bordeaux; to Orleans; to Paris and Havre; also, how it can go from Strasbourg to Paris and Havre; or from Strasbourg to Lille and Calais. About one-fourth of all the foreign trade of France is in goods that thus cross it on the way from one foreign country to another. Compare the distance from Naples in Italy to London by river and canal across France with that by ship around Spain.[1]

Again the teacher asked for suggestions as to what they should do with the paragraph, and the children decided that another reference to the map was necessary. They traced the water routes which are mentioned in the paragraph, and then came the first question from the children. What do they have to carry about on the water from place to place? Is it the same kind of freight that we have in this country, such as we studied about in North America—such things as coal and lumber and machinery? Another child suggested, "Couldn't we make a map of the world with colored strings showing what things come from other countries and where they go, the way we did when we studied New England?" The other children also seemed interested in this suggestion and the teacher said that she would be glad to help them with it.

This sort of reading was continued for the rest of the period and most of the next period. Of course such reading was slow, and the children had covered only two or three pages at the end of it. The following questions had been suggested by the children:

[1] McMurry-Parkins, *Advanced Geography*.

1. What is being done to restore the devastated areas of France?
2. Are the French good farmers? What do they raise?
3. Do most of the people of France farm or work in factories? Are French factories like ours?

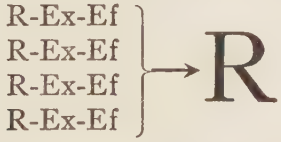
The assignment for the next period was to continue the same sort of reading that had been done in class, making note of new problems and any answer to those that had been suggested already.

Now, let us examine the efforts of this teacher to secure readiness. To begin with, let us note that the children started their work with a natural predisposition to follow the teacher's suggestions and to study the next topic which she suggested. We have had a foolish notion in some of our modern educational theories that children do not like to do what the teacher suggests, but are more eager to do anything which any child might suggest. This notion is utterly contrary to real facts as any student of childhood knows. Children welcome and enjoy suggestions by adults as to what to do next. Moreover, if the cordial attitude between the teacher and pupils, which ought to exist in every classroom, does obtain, children are doubly ready to listen to the teacher's suggestions. They know that she has lead them through many interesting study experiences in the past, and they are content to trust her for future suggestions.

Now, let us consider for a minute the sort of work which was done in the class period described. The children in their study were not actuated by any large problem about France. No one would claim, how-

ever, that thinking was not going on in studying, sentence after sentence, the statements in the text. We seem to have had the idea in some of our theory that thinking takes place only over a broad, general, and inclusive problem. This is not true. A very small problem may require the keenest sort of incisive thinking. Too much of our problem study in geography has been concerned with problems so broad in scope that only the teacher can keep them clearly in mind.

Let us not forget the purpose of the teacher in this whole class exercise. She was striving so to conduct her work that the children would generate real study purposes. In the course of this process, as we have pointed out, thinking was going on all the time. Study purposes or readinesses have too frequently been thought of as inspirations engendered out of ignorance. As a matter of fact quite the contrary is true. The real situation may be illustrated best by the accompanying diagram.




Readiness—exercise—effect concerning a number of small problems produced the larger readiness. The smaller problems which were taken up in class were each combinations of readiness inspired by a question or a problem of small scope in the textbook, leading to a short period of study and accompanied by the satisfaction of finding a definite answer. It is out of

all such smaller units of learning that the larger study purposes grew. Such a situation is typical of what goes on in real life. The business man, for example, is faced with a small problem of office routine which he solves more or less satisfactorily. Another problem of office routine comes up, and still another. Finally he sees that his whole office management needs reorganization, and the larger readiness is the result of the partial solution of a number of smaller thinking problems.

We have drawn our illustrations in this chapter from the study of geography. The same principles, however, hold in any of the other content subjects. For example, a teacher is beginning the study of percentage in arithmetic. If the children at that time are much interested in a series of athletic events and need to figure out percentages of gain or loss in the standing of the teams, the teacher can easily set the stage, so that the purpose to study percentage will result. On the other hand, if no such need at the time exists, she may suggest to the children that the next topic in the study of arithmetic is percentage and have them do some of the beginning problems in the text with the question in mind: In what ways does the ability to use percentage help people to live happier and more efficient lives?

The writer does not mean to imply that experience with a textbook is the only sort of experience which the teacher can easily provide and which will help children to discover study purposes. The lesson described above is simply one suggestion of how children may be plunged into subject matter which will

be likely to lead into a readiness for study. If there is a museum easily available, a visit there will help to secure readiness for many topics. The showing of stereopticon slides or other sorts of pictures is another good method of attaining the same aim. The important thing is not the peculiar technique that is used, but it is the fact behind the technique that children are going through a series of activities or experiences which are likely to lead into the finding of study motives.

At this point the objection may be raised that when the teacher directs the children to the study of a book or of a picture or of museum materials, she is really doing the same sort of thing that we have called setting the stage. In a way this is true, for the two sorts of approach may blend into one in most cases. However, two distinctions may be noted between them.

To begin with, in the second type of approach the activities of the children are similar to those in which adults frequently and naturally engage themselves. We all read newspapers, magazines, and books; experiences similar to that of reading textbooks. We all see exhibitions of various sorts and frequently have the opportunity of looking at unusual and interesting photographs. It is excellent training, therefore, for adult life, for children to find in such cursory experiences aims and problems for further study.

Second, let us remember that in the first instance of the study of France, described on page 71, the study purpose came very early in the course of the time which was spent on France. In the second instance a great deal of mental activity and the solution of

small problems precedes the establishment of the main readiness or study problem. If, then, we let the line A-B below represent the total time spent on France, study purpose in the first instance might be said to have arisen under the teacher's manipulation or setting of the stage at point C, whereas, in the second instance, it might not arise until D or E.


**Summary.** We may distinguish two ways in which the teacher may stimulate readiness in the classroom. One consists in setting the stage in such a way that the study purpose or readiness may be stimulated. The other consists in plunging children directly into subject matter and then letting the readiness or study purposes be evolved from such activities. The method of introducing children to such subject matter may consist in an examination of the textbook, of pictures, of museum materials, and the like. In real life we find both sorts of stimuli for study, and, therefore, in the classroom we should make provision for both types.

### Study Exercises

Miss L.: "On Friday I told you that we might have special help on those letters which you wanted to write. Today we said that we would practice writing valentine poems for Mother's valentine, so we will have to let those letters go for a while. Unless that valentine is sent soon, I am afraid that Mother won't receive it in time. You know Miss V., in charge of supplies, promised to send us some cards; before that time I think it is well that we practice the stanzas. By doing this, we will

be sure to make no mistakes, for I am sure Miss V. will send us only one card each."[1]

1. For what type of lesson is this class preparing?

2. In what way is the teacher manipulating the environment?

3. Criticize or defend the teacher in letting the letter writing go for a while.

4. To what natural interests of children is the teacher appealing?

5. What is the children's purpose in this lesson? May they have more than one purpose? Are there possible study purposes which might evolve from this lesson?

6. To what degree would the lesson which follows this statement be teacher dictated? pupil dictated? cooperatively planned by both teacher and pupils?

7. What degree of readiness for the writing lesson to follow would you expect to find?

Miss X.: "It is now 10 o'clock—reading time. Take out your books. Turn to page 76. Read the story. If you get through reading it before I am ready for you, read it over again to be sure you know how to pronounce all the words. Look up the words you don't know in your dictionary." (The story is a valentine story.)

8. Contrast the degree of readiness to be expected in this activity with the writing activity.

9. Analyze the attitude with which these children approach the story. What is their purpose in reading it?

10. What effect may this type of teacher dictation have upon children's attitudes toward reading? toward school? toward future teachers?

11. Suggest ways in which this situation could have been improved in order to obtain a high degree of readiness.

[1] *Stenographic Reports of Lessons* (Teachers College Bureau of Publications), p. 22.

## CHAPTER VII

## EXERCISE IN THE CLASSROOM—PART I

**The meaning of exercise in psychology; how it is distinguished from mere drill.** As has been pointed out earlier in the book, teachers have always known that repetition is the very heart of the learning process. Long before teachers had any conception of the necessity or desirability of either readiness or effect, they did recognize that there was no royal road to learning and that repetition of some sort must occur if the desired learning is to take place.

The psychological term for repetition is *exercise*. At first the name may seem unfortunate, since it may make for confusion with the use of the word in its physical sense. When one thinks of what really goes on in the mind during learning, however, he sees that *exercise* after all is the best term, for what really happens in the strengthening of nerve connections is quite similar to the process of strengthening muscles in the body during physical exercise.

Ordinarily when one uses the word *exercise* in its psychological sense to a group of teachers, they immediately think of drill. Most of the learning studies which have been made by psychologists have been in purely drill matters, such as those of learning number combinations or of practicing penmanship. The fact remains, however, that the great majority of the learning in the elementary school should not be of the pure drill variety. Drill, of course, has its place, but

to think of it as the only way of learning leads to most unproductive and stultifying methods of studying and teaching. It is, therefore, most unfortunate that *exercise* and drill are considered by so many teachers as synonymous terms, for as a matter of fact such a point of view is a complete misinterpretation of the truth.

**Repetition may take place in various ways.** *Exercise* really means the repeated use of mental connections. Learning is frequently said to consist of making brain paths in the mind. The metaphor is clear. If one continually walks along a certain line in a lawn, a path will be worn. Such a path may be made in one of two ways. A person might walk back and forth along it continuously for several hours, and as a result the path would be well worn down. Such a procedure, however, seldom takes place in real life. Paths are usually made because one uses them at various intervals in order to get from one place to another. Of course, such use does not wear the path so quickly, but in the end it does it just as thoroughly. Learning consists in making paths in the brain over which we can mentally walk at will. As in drill on a number combination, the path may be worn down rather quickly by continuous use. Too frequently, however, such a path may begin nowhere and end nowhere, because the use of the skill may not be shown in the teaching. In this case the path will seldom if ever be used later, with the result that eventually mental grass and weeds will grow up and choke it. On the other hand, when a brain path is worn because it is frequently needed in solving a problem the

chances are it will be permanent because it is made in the course of using it for a relatively permanent purpose.

Repetition, then, may take place in different ways. For example, a tennis player is anxious to learn a new stroke. One way to learn it would be to practice only that one stroke, hitting the ball up against a brick wall. Another way would be to use the stroke only when it was convenient to do so in the course of a game. The former way might become very tiresome, and besides the player might become so used to having the ball come to him in a certain fashion that in stress of the game his practice might be almost entirely useless. On the other hand, with the latter method of practice there might be so small a number of opportunities in any one game to use the stroke that a long period would be required to learn it. A combination of the two ways would seem to be the best solution of the problem.

A child learning the multiplication table is in much the same situation as a player learning a new stroke in tennis. If the teacher relies on his need for each of the number combinations in order to solve a problem of which he wants to know the answer, the teacher is likely to find that insufficient repetition for real learning will be the result. On the other hand, training in the multiplication table apart from its use in problem solving may be almost useless in helping children to meet their needs.

Let us not forget, as has been stated, that repetition may take place in various ways. For example, let us suppose that a child is expected to learn the

location of New York City. One way to learn it would be to repeat over and over again the following statement: New York is located in the southeastern part of New York State, at the mouth of the Hudson River, and on New York Bay. If the child repeats this frequently enough, it will be stamped into his nervous system, and he will remember it. On the other hand he may learn the location in a somewhat different way. In much of his previous geography work he has had it borne in upon him that large cities tend to grow up where there are good harbors. The New York Harbor is one of the best along the entire eastern seaboard, and it is natural, therefore, that a great city should be located there. In the same connection the child would also come to realize that any natural routes, such as rivers which lead into the interior, would act as a source of growth to cities connected with them. The Hudson River, therefore, made its contribution to the growth of New York City.

In the course of his study of the eastern states, the pupil has come upon the fact that along the coast at some distance from it is the Appalachian chain of mountains. This offered a serious barrier to westward expansion during our early history. In this connection the child would learn that any breaks through the barrier were eagerly welcomed by the pioneers and that cities connected with those breaks would be likely to grow. The Mohawk water gap, connected with New York by the Hudson River, is one of the most satisfactory for transportation of any of the breaks in the Appalachian System.

When the child begins to study the central states or the commerce of New York City, he again has to use the location of New York City. Thus, although the child may never once repeat the statement of the location of New York City given above, yet through repetition of its separate parts in the context of his study he learns the location. There is repetition in both cases, but of vitally different sorts.

**Association of ideas as an efficient form of exercise.** The mind is so constructed that the hardest thing in the world to learn is a totally isolated fact. It is easy to see how this may be true. If we think of a fact as a brain path, then we must admit that the totally isolated fact is like a path which is never used except when drill on that fact is taking place. On the other hand, a fact which is well connected with others, or, to use a technical word, associated with others, is used not only when drill on it is taking place but also when facts or ideas allied to it are being thought of. In other words, the easy way to learn any fact is to associate it with others naturally connected with it. No one has to be drilled very much in order to learn an interesting bit of gossip about some one he knows well. On the other hand, we are not likely to remember gossip about people whom we do not know. The reason that a bit of gossip about a friend is easily remembered is that it is associated immediately with all of his eccentricities or habits.

In real life we are all of us thoroughly familiar with the notion of the association of ideas. We have all of us undoubtedly worked out various memory schemes, technically known as mnemonic devices. For ex-

ample, a student remembers that litmus paper is turned red by acid and blue by alkali through remembering the *d* in red and acid and the *l's* in blue and alkali. A story is told of the great scientist Huxley. One of his students had difficulty in remembering that the mitral valve is in the left side of the heart. The mitral valve is so named because of its resemblance to a bishop's mitre, and any one who is familiar with Huxley's life will remember the difficulties which he continually had with the clergy. When the student in question said to Huxley one day, "I cannot seem to remember on which side of the heart the mitral valve is located," Huxley responded, "Egad, man, did you ever know a bishop to be in the right?"

Any one who has taught music in the elementary school will remember the sentence, "Good deeds are ever bearing fruit," which is the mnemonic device for learning the names of the sharp keys.

Of course, we are not implying for one minute that mnemonic devices are of any considerable use or value in the elementary school. Our point is simply that if a teacher wants to have a fact remembered, she should associate it with other facts which are familiar to the children. This is simply the scientific explanation of the Herbartian doctrine of apperception. It seems strange that in the face of the fact that this doctrine has been preached for four decades in American normal schools and teachers colleges, so little real use is made of it in many classrooms. When one visits schools, he is appalled by the disconnected character of so much of the learning. Place location in geography, dates in history, items of technical grammar in

English, individual verses of poems in literature, isolated facts and processes in arithmetic—all, taught without any reference to context or any known meanings, are too frequently the rule in our schools.

Learning, then, is a process of establishing mental connections as well as of deeply impressing individual brain paths.

From anything that has been said so far, however, one would be led to conclude that the establishment of any sort of connections at all is all that is necessary for efficient learning. The implication would seem to be that one sort of connection is as good as another. Such, however, is not the case, as may be deduced if one will remember the brain path simile. There is little value in making a path if there is small likelihood of using it again. In the same way there is little value in making connections in the mind for the purpose of learning if the connections are useless or positively harmful. Much of our learning in the past in the elementary schools has consisted in establishing wrong or useless connections. For example, multiplication tables used to be learned in sequence. The result was that in order to find the answer to six times four the child had to take a sort of running start and repeat mentally, "six times two are twelve, six times three are eighteen" before he could say "six times four are twenty-four." Certain connections had been formed which were really harmful for later work.

It seems obvious then that the real heart of this matter of exercise consists in answering the question: On what basis shall we make our mental connections? To answer this question a stenographic report of a

lesson in the Horace Mann School is given for discussion.[1] In this lesson active connection forming was taking place.

Mr. H.: All right, young folks, we are off then today to take the first step in the organization of our new project, and I am asking the Secretary to write it on the board here for us. Now, I want right at the very start to read something to you that I found the other day—or that my Junior Class found when we happened to be reading in this book by General John B. Gordon, *Reminiscences of the Civil War.* General Gordon, you know, was one of Lee's right-hand men, stayed with him from Bull Run to Appomatox, and he, at the very beginning of his book on *Reminiscences of the Civil War,* has a chapter on the causes of the War, and I want to read just one sentence.

> When the Constitution was adopted and the Union formed, slavery existed in practically all the states; and it is claimed by the Southern people that its disappearance from the Northern and its development in the Southern States is due to climatic conditions and industrial exigencies rather than to the existence or absence of great moral ideas.

What is he driving at there? I will just throw that to you at the start today. We always like to get the geographical background. I am going over that again (reads above sentence again). Well, let's have what you think that means.

Pupil: That it is not so much the moral side . . . the differences in the North and South concerning slavery that caused those in the North to disapprove of slavery, but it was more climatic conditions, and I think that has a lot to do with it . . . the condition of the soil, the fertility of the soil, and the great spaces that they had in the South made it so fitted that the negroes could work there. I think it is more climatic

[1] *Stenographic Reports of Lessons* (Teachers College Bureau of Publications), p. 1.

and physical conditions that caused the objections to slavery in the North rather than any moral ideas.

Mr. H.: What would you want to add to that?

Pupil: Well, in the South they had these huge plantations and raised cotton, and they had to have a lot of labor to pick the cotton and take care of their places because in that time these things were not done by machinery and they had to have lots of negroes to do this kind of work.

Mr. H.: Wouldn't they have that kind of thing in New England?

Pupil: Well, they didn't have cotton in New England. They used to have small farms there.

Mr. H.: Why didn't they have cotton in New England?

Pupil: Because of the climate.

Mr. H.: Climatic conditions. In New England I know one of the greatest crops we produce is stone walls. Some one has said that New England produces crops of boulders and troubles.

Anything further?

Pupil: I think the heat is such in the South that the white man is unable to work and that makes it necessary to have negro labor. I think that is one of the biggest reasons why they had to have slavery there.

Mr. H.: All right; I want to go one step further with you. Here, girls, I brought these atlases this morning. I want you to take one and turn to map 99 . . . there is a physical map . . . physical outline or map of the United States. Let's study a bit together. Notice your color scheme in regard to the formation of land here. Note your mountains, your plateau areas, and your mountainous areas. Now, along the Atlantic Coast—here's your Appalachians, and as you are looking at that, I want to read a bit from this book. This book is called *American History and Its Geographic Conditions*. Do you see the significance of its title? *American History and Its Geo-*

*graphic Conditions,* by Ellen Churchill Semple, and she starts this chapter—I don't believe you will get this:

> Civilization is at bottom an economic fact, at top an ethical fact. Beneath the economic lie the geographical conditions, and these in the last analysis are factors in the formation of ethical standards.

(Class is intensely interested but makes no response.)

Mr. H.: Want to try that again? I'll read that again, and if we don't get it now, we will come back to it. "Ethical"—do you know the meaning of that term? What does it mean, Ruth?

Ruth: The right and wrong.

Mr. H.: The right and wrong of things. Just hold that thought and I'll go on a bit:

> The question of slavery in the United States was primarily a question of climate and soil, a question of rich alluvial valley and fertile coast-land plain, with a warm, moist, enervating climate, versus rough mountain upland and glaciated prairie or coast, with a colder, harsher, but more bracing climate. The morale of the institution, like the right of secession, was long a mooted question, until New England, having discovered the economic unfitness of slave industry for her boulder-strewn soil, took the lead in the crusade against it. The South, by the same token of geographical conditions, but conditions favorable to the plantation system which alone made slave labor profitable, upheld the institution, both on economic and moral grounds.

Mr. H.: What is the meaning of the word "mooted"? I will lift you there—a long-debated question—like the right to secession.

Now, let's look at our maps. See if we can't understand that. Here is a geography talking to us. Now, look at that.

You know the Appalachians are the oldest mountain range in the United States. The Rockies over here—they are young mountains in comparison with these great grandfathers on the Atlantic Seaboard. And as you look at that from the point of view of geography, what hits you right in the eye? Oh, Elizabeth, you didn't get to see—come over here and look at this map.

Pupil: Well, up in New England it looks much more mountainous than it does around Virginia and the Carolinas except in the eastern side of Virginia. There you bump right into the Appalachian Mountains, but over near the coast it is regular flat land.

Mr. H.: Now, you say on the east you bump right into the Appalachian Mountains. . . .

Pupil: I mean on the western side.

Mr. H.: Well, let's not make any slip-up here. You see how that whole coast line runs, and how it would be if I were drawing lines right through the center?

(Draws on blackboard a rough outline map showing that the Appalachian mountain range is much closer to the Atlantic coast in the New England States than in the Southern States.) Do they widen as I go up or do they narrow?

Pupils: Narrow.

Mr. H.: Narrow as they come down. What do we call these, geographically speaking, where we have the Virginias and Carolinas?

Pupils: Plateaus.

Mr. H.: Are those plateaus?

Pupils: No, plains.

Mr. H.: What kind of plains?

Pupils: Coastal plains.

Mr. H.: Up here what have we? Now, look at that line.

Pupil: Shore line—that's what I'd call it.

Mr. H.: I recall that, geologically speaking, we speak of those as drowned lands. See the significance of that term? What does it mean, Frances?

Frances: The land drowned by mountains.

Mr. H.: Do we speak of mountains drowning any one?

Pupils: No, water.

May: Does it mean that once upon a time there were plains out farther and they sunk below sea level?

Mr. H.: Sunk, that is, they have gone down. That being the case, what would you expect to find?

Pupil: Good harbors.

Mr. H.: You would find good harbors and that type of thing. Then, can you tell why coastal plains happen to be down in the South?

Pupil: Well, I have read about a glacier that came down. I don't think it got quite down to the Southern States, but I think it smoothed out the land.

Mr. H.: Well, you have read of glacial formations. Would that account for that?

Pupil: It would account for smoother plains.

Mr. H.: Well, if it didn't seem to work in the North, why would it work in the South?

Pupil: I think that the glacier came down and went all over New England and missed the Southern States and that is the reason there are holes in the ground and the ground is fertile.

Mr. H.: Well, I guess we will have to work considerably more geography in, in regard to climatic conditions. But we know that the glacier didn't come down as far as the South, so it couldn't account for the coastal plains.

Pupil: I noticed that there are so many little rivers down there . . . and you find . . . wouldn't they build out the plain?

Mr. H.: What do you think of that? Now, will you look at

this relief map right here for just a moment, and you will see that fact brought out. Do you see those rivers and how they have been bringing down for years and years sediment or mud from the mountains? Do you recall the name they gave to the Missouri River? Don't you remember they called it "The Muddy Missouri"? I happened to be reading in Parkman's *Oregon Trail,* and he said he could take a glass of water and let it settle for about an hour and there would be a half inch of mud in the glass. That is, all those rivers are carrying along in their courses this alluvial mud. What kind of land does that make?

Pupils: Fertile.

Mr. H.: All right, Margaret.

Margaret: It makes very fertile lands because it brings down the pieces of the mountains.

Mr. H.: Yes, you would get fertile deposits. Have any of you ever been along the Connecticut River between Hartford and Springfield? What is the nature of the countryside there, Nan?

Nan: It's very green—I guess I am wrong because they are all laughing—but I did think it was very green, but flat and uninteresting. . . .

Mr. H.: What about the nature of those hillsides? If you have motored through that section . . . do you know what they grow? Have you seen it growing?

Nan: Well, they grow tobacco. It is rather uninteresting country to ride through—very, very fertile, and it is really terribly flat.

Mr. H.: I will accept that description with the exception of its being uninteresting, but it is true that those deposits are built up and all those sections are fertile and grow a large crop of tobacco. Now, I have here also one more thing that I want to bring to your attention. I want you to see the thing we are

trying to draw out is geography rather than history—and this is very important. This is Slavery in New England. . . .

Now, in our old church, I distinctly remember back there in the gallery, the negroes always used to go upstairs, even when I was a boy. There weren't slaves then, of course, but just a little bit of a hand-over of that institution. (Reads from *Epochs of American History* by Reuben Gold Thwaites.)

> Slaves were comparatively few in number, the greater part of them being house and body servants, and they were not harshly treated; travelers have left record of the fact that some of the humbler farmers ate at table with their human chattels. The race was, however, generally despised, and in one of the old churches in Boston is still to be seen the lofty "slaves gallery." Judge Samuel Sewall issued the first public denunciation of slavery in Massachusetts, in a pamphlet issued in 1700, wherein he denounced "the wicked practice." But the colonists in general saw nothing in the system to shock their moral sense, and it was not until the Revolution that anti-slavery ideas began, in New England, to spread beyond a narrow circle of humanitarians.

Now, I want you to get the idea of this whole bit of work that we have been doing. Let me read once again this paragraph in this little book, and see if you catch it now. (Reads again quotation regarding bases of civilization.)

Pupils: Ethical.

Mr. H.: And we said "ethical" meant what?

Class: Right and wrong of things.

Mr. H.: Distinction between right and wrong. Beneath that what kind of fact lies?

Class: Economic.

Mr. H.: And underneath that comes what?

Class: Geographical conditions.

(Draws outline on board):

Ethical
Economic
Geographical

Mr. H.: And there we are referring, of course, to what?

Class: New England.

Mr. H.: New England situation. And this is interesting to go on still further with that and follow that idea out. I don't know whether any of you might like to work a little bit further with that; if so, it is right on my desk and you may do so.

Now, let's get that down where we want it. Will you start recording Secretary?

She has put on here No. I. Historical Background. Is that what we are after?

Class: Geographical Background.

Mr. H.: Well, just erase the word "historical" and put "geographical." I'll just raise a question here. Is it geographical background we want? I have taken fifteen minutes—is it worth fifteen minutes' time to stop and get this geographical background? I wonder if it is? I would like to raise this question. This question isn't in your book at all. Is it worth while? I would like to raise that question.

Pupil: I think it is worth while because in the end—rather in the beginning—history depends upon the geographical background . . . because everything that has ever happened depends upon the climate, and everything depends upon geographical background.

Mr. H.: Geographical conditions are often causes you think, so that you think it is worth while. Well, I am going to ask you what shall we put here as the essential things. (Refers to outline on board.) Let's get it up here quickly. How best can we put that down in our outline?

Pupils: Climate . . . soil.

Mr. H.: Let's make definite statements. Don't just throw a word at me.

Pupil: Fertile soil and warm climate versus barren soil and cold climate.

Mr. H.: Hold that thought for a bit. Is there anything further?

Pupil: Mr. Hatch, I wonder if it wouldn't be better to just put climatic conditions and then put those down under subtopics.

Mr. H.: Is it wholly a question of climate?

Pupil: Climatic conditions and the soil.

Mr. H.: Before you take up then their soil, there is one other thing we went back to get. What do we call that?

Pupil: Physical conditions.

Mr. H.: Physical conditions—physical differences. I like the term, differences, rather than conditions. (Writes on board: A. Physical Differences.)

And what under that?

Pupil: I would put New England.

Mr. H.: (Writes: 1. New England.) And what is typical of New England here?

Pupil: Stone walls.

Mr. H.: Oh! By the way, there is a beautiful poem by the blind girl—Keller, I believe—how many of you know that? I think you might enjoy reading that. It's a poem about the "Stone Walls." I think most of my ancestors must have spent their time building stone walls.

But what did we call these lands?

Class: Drowned lands.

Mr. H.: (Writes on board: (a) Drowned Lands.) Some people call this the worn out and aged Appalachian. Now, your drowned lands now. . . .

Pupil: Rocky soil.

Mr. H.: (Writes on board: (b) Rocky Soil.) Anything else in regard to New England?

Pupil: The climate.

Pupil: The length of the winters.

Mr. H.: Wouldn't that come under Physical Differences?

Pupil: Yes.

Mr. H.: Then what would you want to take up there next?

Pupil: The South.

Mr. H.: Your Southern differences. Hold on, though. You haven't got all in there. The drowned lands in there would make what?

Pupils: Harbors.

Mr. H.: Good harbors. Let's get that in here. (Writes on board: (c) Good Harbors.) I wonder if they had any relationship to the early development of New England?

Pupil: On commerce.

Mr. H.: Commerce and manufacturing. What was one essential difference between the streams of New England and the streams of these coastal plains?

Pupil: In New England they had force and they went very swiftly; and in the South they just went along gradually and were very muddy.

Mr. H.: Do you see why those rivers in the South would be slow and sluggish, and do you see how all that explains itself? Do you see how that ethical idea gets in on top of that? I hadn't thought of that, but now we get a commercial glimpse also. I am thinking of a man whose son I knew very well, who got out a paper called *The Liberator*. Who was that?

Pupils: William Lloyd Garrison.

Mr. H.: Well, William Lloyd Garrison was pulled from his shop with a rope around his neck. Who would be so harsh with William Lloyd Garrison because of his views on slavery?

Pupils: The Southerners.

Mr. H.: You might think of that in the South, but you

wouldn't think that that was done right in the city of Boston. Why should Boston be pulling William Lloyd Garrison by the hair of his head around the city? Well, we are finding a true fact in what we just read.

Pupil: I am not sure, but I think there would be a good harbor there, and as long as Boston was a commercial city they might bring all the cotton and things there, and it would be more of a trading center; therefore, Boston would want the cotton shipped there, and wouldn't want the South to be able to take care of it.

Mr. H.: And anybody who is talking against that institution is going to do what?

Pupil: Harm their business.

Mr. H.: I remember as a boy being shocked to learn that Faneuil Hall was given to the city of Boston by Peter Faneuil, and old Peter got the major part of his wealth by trade in slaves. We have to be a little bit careful before we call the kettle black—we folks, who live in New England.

Well, now the good harbors—the first characteristics. Next, we want to bring out the climatic conditions—hold on though.

. . .

Pupil: Didn't you say something about small farms because they did have something to do with the question?

Mr. H.: (Writes on board: (d) Small Farms.) Now, there is a tremendous significance about those stone walls. I would like to talk and talk and talk about those stone walls. But we talked about rapid rivers. Let's put that down. (Writes on board: (e) Rapid Rivers.)

And now the South. (Writes on board: 2. South.) What conditions have you here in the South?

Pupil: Fertile fields.

Mr. H.: What do we call those . . . called the other drowned lands—what do we call these?

Pupil: Coastal plains.

Mr. H.: (Writes on board: (a) Coastal Plains.) Coastal plains are very fertile indeed. You can build that right up, can't you? Wait a minute. Can't you people go right on with that yourselves—just build it up as we have begun here? Will you take that as your home work? Organize that whole question of geographical background. That is your work for next time.

What are we after next? No. I is geographical background. What is II?

Pupils: Historical background.

Mr. H.: (Writes on board: II. Historical Background.) We've got to hurry on because our time is about up. This historical background will take us how far back?

Pupil: Introduction of slavery.

Mr. H.: (Writes on board: A. Introduction of Slavery.) What is the date of that?

Pupils: 1619.

Mr. H.: Strange that 1619 is a very important date. I am just thinking of three reasons why we should know that date.

Perhaps some of you can tell me next time what they are. What are the three reasons why we remember this date—1619?

Pupil: Don't you think we ought to say something about the slaves and how they lived and where they came from?

(Considerable discussion among pupils as to the proper placing in the outline of the characteristics of the slaves. The matter is put to a vote before the class, and the majority favor studying this question under the introduction of slavery.)

Mr. H.: Make a note of that, please. And now our time is over, but just let me see how many have read anything today other than their textbooks.

Pupils: (One after the other). I read *World's Work* . . . Ellsworth . . . Thompson's *United States History* . . . Article

in the *Saturday Evening Post . . . Encyclopedia Britannica . . . Saturday Evening Post.*

Mr. H.: Are we clear now in regard to tomorrow's lesson? Well, we will have to go now.

If we examine this lesson, there will be no doubt in our minds that it was a study lesson. The children were actively engaged in mental connection forming with the purpose of retention of material which they are considering. The teacher was concerned, first, in placing certain ideas and information before the class and, second, in so organizing it that the children would remember it. He introduced no information without showing its definite bearing on the other subject matter with which the class was dealing. The lesson presents almost an ideal learning situation, if by that term we mean a situation where mental connections are being formed. Referring to our previous simile of brain paths, we may well visualize the results of this lesson as being a network of paths, every one leading to one or more of the others.

If we ask ourselves what facts were actually learned, we will discover that they can be summarized in a few words. The class learned that the opposition to slavery in the North and its favorable regard in the South were traceable in part to geographical conditions. The points of view in the South and the North were due to the fact that the Appalachian Mountains are close to the coast in New England, where there is a cool climate, and that they are at a considerable distance from the coast in the South, where there is a warm climate. Slavery, therefore, would be of con-

siderable help in the South and of little help in the North. As a result it was easy for the North to see the unmoral aspects of slavery, and it was difficult for the South.

As we have pointed out, it would be comparatively easy to put such a summary on the blackboard and have the children memorize it. The memorization could have taken place purely through the agency of repetition, and at the end of the learning the children could have passed a good examination on the particular facts. Such learning, however, really leads nowhere; and being totally unconnected with other important facts about the Civil War, it might be almost useless to help children to understand the real situation in that conflict. As it was handled in this recitation, however, the facts and ideas were truly functional; that is, their relationships were so thoroughly established that they became part of the total concept of our Civil War.

It has been previously stated that mnemonic devices, or mere brute memory, are poor bases for the association of ideas. The question asked before this lesson was introduced was: What shall be the bases for the association of ideas? The answer now seems reasonably clear. Ideas should be associated in their relationship to the solution of thought problems. This point of view has already been expressed in our discussion of readiness, where it was stated that a problem, the solution of which challenges children, is the best sort of readiness. It must follow, therefore, that the best sort of exercise is the collection and organization of data to answer this problem.

Most recitations may well be devoted to this matter of collecting, organizing, and interpreting facts and ideas in the light of their value for the solution of the problems established during the readiness phase of instruction, and to the matter of comparing, evaluating, and revising conclusions and ideas arrived at by pupils during individual study. "The sole direct path to enduring improvement in the methods of instruction and learning consists in centering upon the conditions which exact, promote, and test thinking. Thinking *is* the method of intelligent learning—of learning that employs and rewards mind."[1]

The teacher who taught the lesson above was conscious at all times, as he revealed in the conduct of the recitation, of the importance of the idea of "centering upon conditions which exact, promote, and test thinking." If one examines his questions, one will note that in each case they were aimed at a thought and not a mere answer. The whole lesson reveals a respect on the part of the teacher for the thought process of the children; a respect which was particularly lacking in the recitations of the old type.

**Associations on a thinking basis help in organizing ideas.** In this connection it is also worth noting that the teacher took time at the end of the recitation for the organization around the central problem which was being discussed, of the material which had been presented. It cannot be too strongly urged that such organization of ideas is the heart of the process of exercise. This will be obvious if one re-

[1] John Dewey, *Democracy and Education* (Macmillan Company), pp. 179-180.

members that exercise consists in associating ideas around thought problems. The process itself, therefore, means organization, but it is not enough that the smaller individual data shall be grouped around thought problems. A bird's-eye view of the whole is also necessary for efficient retention of the subject matter. One can easily see this if he will look at the figures 8172453. In their present form it is difficult to remember which digits are mentioned. If, however, one expresses the digits as follows: 12345-78, it is very easy to remember them, because they are organized into a form which associates itself with other knowledge.

The teacher, therefore, may well reserve five or ten minutes at the close of a period for the organization of the material which has been presented, into such a form that it is associated with what went before, and in a meaningful sequence of ideas. If a teacher finds this difficult to do, she may well look critically into the conduct of the recitation itself and may ask whether the ideas and facts were really connected and associated in the minds of the children at the time they were presented. It would be practically impossible to make a summary of the old-fashioned type of recitation where individual bits of information were required by the teacher and recited by the pupils. A thinking period, however, where exercise of the best type has been going on, becomes comparatively easy to organize at the end.

It is not expected that all forming of conclusions and organization of facts shall be done as a group activity under the direction of the teacher, as is done

in the lesson reported on pages 95-107. As the pupils acquire a method of study, an increasing amount of this work should be done individually. The teacher will establish a readiness, definitely outline the problem, and indicate sources for facts which may be used in the solution of the problem. The individual study may be done under the direction of the teacher or independently. Directing the study of pupils should be done individually when the pupil has reached a point where he cannot make further progress without help. The group activity will then consist in a comparison and evaluation of ideas and conclusions and in developing methods of study as needed.

**Summary.** Although exercise is often identified in the minds of teachers with mere drill, it is in fact a much broader term, and really means the establishment of mental connections. Such establishment of mental connections may be made in various ways, pure repetition being one of these, and association of ideas another one. Associative learning is likely to be much more interesting and effective than pure repetition. Associations should be made on the basis of thought problems, because in this way they closely relate themselves to the best kind of readiness, and also lend themselves easily to a later organization of ideas.

### Study Exercises

Each day, in a certain second grade, before the teacher arrives, the pupils place their orders for lunches. The two pupils who come first in the morning take charge of the money box and the recording of the orders. These two children are responsible for the correctness of the order and the amount of

money on hand for that day. When the teacher arrives the orders and money are checked and then given over to the person who supplies the lunches. The checking is done with the cooperation of the entire class.

1. What values do you see in this daily activity in a second grade?

2. Distinguish between the type of exercise in this activity and the type that the author terms "mere drill." What do you consider to be the most important difference?

3. May problem solving enter into this activity? How?

4. Compare the relative value of the activity for the child's present life and future life.

5. Discuss the connection between the type of situation and the type of associations with arithmetic these children are making.

6. On what level would you place the degree of readiness such an activity is likely to produce? Is this of concern when we consider exercise? Does this type of readiness satisfy the two readiness criteria stated in Chapter V?

7. Are attitudes also being exercised in this activity? Compare the attitudes of these children with those of children who are required to write the two-table ten times.

8. Do you believe that this daily activity would provide sufficient repetitions to fix the number combinations these children need to know?

9. Consider the boy mentioned on page 19. Do you think that the same type of drill on their own initiative might arise with arithmetic in this class? What would be the basic interest in the drill then? What difference would there be if this teacher insisted that the children couldn't check lunch accounts until they knew all the necessary arithmetic?

10. Can you find any activity in which exercise does not exist?

## CHAPTER VIII

## EXERCISE IN THE CLASSROOM—PART II

**Conceptions of the use of skills should precede their acquisition.** Bearing in mind the contention of the previous chapter, that the best kind of exercise or connection forming consists in establishing thinking relationships between facts, one naturally inquires about the learning of such skills as number combinations, spelling, penmanship, and word recognition. It is difficult for these to be introduced with sufficient frequency into the thinking process for efficient learning to take place. We have the same situation as was indicated in our illustration of the tennis player. If he practices one stroke constantly, he may learn it, but he may be able to use it only when a ball comes to him in a certain way—the way in which he has practiced it. On the other hand, if he uses a stroke only in the course of a game, it may take him a long time to learn it. It was suggested that a combination of the two methods is best. Let us see what this combination would be in learning such skills as are mentioned above.

It would seem obvious at the beginning that if we want the brain path, say of six times seven, to lead anywhere, the need for six times seven should be shown in the course of a thought process. Such is indeed the case. There is nothing so contrary to good teaching in the early grades of the elementary school as the introduction of number drills before any num-

ber uses have been shown. Such number uses may be easily and naturally encountered in the course of the activities which arise in a good primary class.

Are there pennies enough, or sheets of paper enough, or wood of sufficient length for such and such a purpose? How many beans did I plant and how many have come up? About how many radishes does our market-man put in a bunch? Can I get a bunch of that size from my garden bed (or box) for my mother? Do I know how to write the numbers properly for the pages of the book I have made? How many more paper doilies must we make for our expected guests from another class? Is that score for our game added correctly? A slight error may give the game to the wrong person. Are any scissors missing? There should be twenty-five pairs. How many minutes by the clock does it take this class to get on their wraps? How many minutes for the quickest child? How many for the slowest? Let us see if we can save enough time for a story. How much ought we to charge for this lemonade? How can we find out? What will the best lily bulbs cost us? Can we afford to buy another kind for our Easter bowls?[1]

When such needs as are suggested above have been met in the classroom, the children are easily made aware of the need for number skill. The writer visited a class in a roof school in New York City, where the children had their classes in the open air. Weather meant a great deal to these children. It controlled the wraps which they wore, their use of the unprotected roof playground, and the whole conduct of their recitations. It was a fourth grade class and they were beginning the study of long division. Because of the fact that weather was an ever-present

[1] Annie E. Moore, *The Primary School* (Houghton Mifflin Company), p. 285.

and important topic to them, the children were led to an interest in a study of physical phenomena. Average temperature and average rainfall were naturally suggested by the children as being interesting subjects for a study. Both of these required long division, and thus a need for the skill was shown. It is obvious, however, that the only divisors which would be necessary in such a study would be 7, 28, 29, 30, 31, 365, 366. An acquaintance with only these divisors would not give sufficient practice in long division. After its use had been shown, therefore, it was only natural that the teacher should use straight drill methods. As the children acquired facility in the skill, other uses than those for the study of weather were introduced; average heights and weights in the class, the individual contribution of each pupil toward the purchase of new material, and other like needs for long division were brought in. But the class could not get along without the drill itself, because in the problems suggested, insufficient practice for facile manipulation of skills was sure to be the result. The brain paths necessitated by long division must be worn by frequent use, but if the use takes place as indicated above, the paths come from somewhere and lead somewhere.

**The difference between repetitive and associative learning.** To distinguish learning on the skill level from such learning as was indicated in the stenographic lesson given in the last chapter, we may call the latter "associative" learning and the former "repetitive" learning. Of course repetition takes place, as has been pointed out, in both cases, but with

repetitive learning repetitions are much more frequent and much less subordinated to needs. One of the most serious criticisms which can be directed against much of our teaching is that information which should be acquired through associative learning is learned through repetitive methods. Take, for example, the learning of place locations in geography. Too frequently place locations have been learned through humdrum and meaningless repetition of a certain verbal formula. This is totally unnecessary, for the fact is that all locations are either the result of interesting geographical causes or else have interesting and important effects on home life and occupations. Man-made locations, such as those of cities, towns, manufacturing plants, industrial centers, canals, bridges, and dams, are always placed, not because of caprice, but because of definite geographical reasons. Natural locations, such as those of mountains, rivers, plateaus, plains, deltas, and lakes, all have definite effects in human responses. It seems obvious, therefore, that any location, if man-made, should be learned in connection with its causes; if natural, in relation to its effects. We have indicated in our discussion of the location of New York City how this may take place.

Dates in history constitute another sort of knowledge which has too frequently been acquired through repetitive rather than through associative learning. It is obvious that mere knowledge of dates is of no value to any one. The reason why we want to know dates is that such knowledge fixes an event or a movement in its relationship to other events and move-

ments. In other words, the use that is made of the date naturally indicates the way in which it should be learned; namely, in connection with other allied dates and events.

In this fact we have the solution for the problem as to what sorts of knowledge should be learned through associative and what through repetitive learning. If a bit of knowledge is to be used in a large number of situations and in many contexts, as in the case with the number facts or spelling of words, then it should be learned through purely repetitive methods. If, on the other hand, a bit of knowledge is to be permanently associated with a certain context or a series of ideas or thoughts, it seems equally obvious that it should be learned in association with that context.

**The need for detail in the associative learning.** We have stated that one great trouble with much of our elementary school teaching is that facts and ideas which should be learned by associative memorizing are learned through repetitive memorizing. In one of the reasons for this situation we find another important principle of exercise. Teachers have failed to use good methods of associative learning because the material which they were presenting was so uninteresting and colorless. Somehow textbook writers and teachers have felt that the way to make a situation simple is to put it in a few words. As a matter of fact just the reverse is true. When one puts a situation into a few words, he leaves out all the interesting and colorful details which make for easy retention.

The modern textbook maker is striving very hard to change this situation and to give to the material

which he presents a wealth of interesting contributory detail. Such detail is the only method of making classroom material real to children, for details rather than broad conceptions and generalizations are the mental food of child life. It is true that generalizations and concepts should be established in the minds of children very early; with some simple ones, the earlier the better. But it makes a vast difference whether the logical method is followed with the concept learned first and the supporting data second; or the psychological, with the data considered first in all their colorful detail, leading eventually to the concept.

As an illustration of such detail embodied in textbook material, consider the following:

THE NEW WAY OF MAKING IRON.—An iron furnace is ten times as high as a room in an ordinary dwelling-house, and is full of roaring fire from top to bottom. Its flames light up the sky at night for miles around. Little car loads of coke, ore, and limestone to make the ore melt easily are dumped into the furnace every few hours day and night, weekdays and Sundays, for months and months. The fire in the furnaces is never allowed to go out, except for repairs; for it takes days to start a furnace, once it stops.

Every few hours a hole is opened in the bottom of the furnace and the melted iron runs out. This is led away down a channel in a sand floor and allowed to run off into little pools where it cools in chunks, each about as big as three or four bricks. These pieces are called pigs. Sometimes the melted iron, still hot, is taken to the neighboring steel mills, heated more, and changed into steel. After this it is poured into big moulds and cooled a little. Then, while still white-hot, it is rolled by big rollers (Fig. 199) into bars, rods, rails for rail-

roads and trolley lines, plates for boilers and ships, parts for steel bridges and steel buildings, and sheets for tin plate.

Note the comparisons in this paragraph which are used to indicate clearly to the children the size of the various things that are described. The author was desirous that the children should be able to make clear and interesting mental pictures. Such details give life and interest to a textbook. The biggest reason why geography, history, and arithmetic have been disliked by so many pupils lies in the lack of interesting, vivid, and colorful detail.

We may find another illustration from the teaching of history. How little use is made of the kind of clothes people of the past wore, the kind of food they ate, their ordinary daily occupations, the appearance, both interior and exterior, of their homes, the kind of implements they used, or other homely details which would make them real people instead of merely shadowy puppets acting on a stage without a clear stage setting. No wonder children find much of history uninteresting. In a recent study of what children who enter the high school know about United States history, it was clearly shown that in every city where the tests were made, the children learned the exploration and colonial period of American history better than any other part.[1] The author indicates that the probable reason for this lies in the fact that the history of these periods was presented with more interesting detail and in a more picturesque way than the history of any other period. If we want children to retain what they study in history, then one large

[1] Benjamin R. Showalter, *An Unpublished Study.*

feature of the teaching must be an attempt to make clear to children how people looked and the details of how they lived.

The same situation holds in geography. We have been too anxious to have children remember locations, industries, surface features, and the like, and too neglectful of details about men and women, boys and girls, who live and dress and work differently from the way we do. It is equally true of arithmetic. We have required children to solve problems involving situations about which they knew nothing. Of course exercise has been ineffective. Every arithmetic problem presents a unit of experience. It is, so to speak, a slice cut out of a total situation made up of many phases. For example, here is a typical problem: The Postville Creamery buys milk every morning from the farmers in the neighborhood. The amounts bought one day are 10 gallons 1 quart from Jones, 6 gallons 3 quarts from Smith, 8 gallons from White, and 7 gallons 2 quarts from Wagner. How much milk was bought on that day?

This is a slice cut out of a total situation. Some of the other phases of this total situation are: How much did the creamery pay for the milk? How much did the milk sell for? How many cows were necessary to produce this amount of milk? How much did they make on their cream? How much cream would there be on the amount of milk for the day? What is a fair price for cream?

**What sort of details are most effective with children?** Apropos of our discussion of the importance of detail in building up the right kind of mental con-

nections, the question arises as to whether any sort of detail produces the desired results. A short time ago the writer observed a recitation in the third grade which indicated clearly the kind of details which are sure to build up vividness of impression in the minds of children. The lesson had to do with one phase of mail transportation; namely, the pony express in the early days of our country. The children had a book in which one chapter was devoted to the subject of this early method of carrying the mail. The teacher had them read silently, and placed before them the following questions for those to answer who finished their reading quickly: In what ways was the pony express mail service unsatisfactory? Why was the new mail service called the pony express?

After all the children had finished their reading and after some of them had written the answers to these two questions, the teacher attempted to lead a discussion on the material that had been studied. This discussion had to do with the answers to the two questions, and the expense and delay incident to this method of mail delivery were brought out in considerable detail. Among the questions discussed were the cost of sending a letter, the kind of paper which was required in order that mail packages might have protection, and the speed of travel as compared with that of the present day. It was most interesting to note the decline in the children's interest as the discussion proceeded. During the reading the interest had been strong, as was evidenced by the vigor of the children's attack on the books. This interest carried over for the first few minutes of discussion, but became gradu-

ally less and less until the teacher was having some difficulty in the control of the class. Details were present in the discussion, but they were apparently the wrong sort of details to produce a continuance of the absorption of the interest of children in the subject matter. When the interest had reached a low ebb, the teacher suddenly asked the children the following question: "Would you have liked to have been a pony expressman?" Almost instantly the interest revived. The tales of Indians and rough country, the long lonely rides over mountain and stream, and the privations and almost insurmountable difficulties were brought out by excited and enthusiastic children. Again details were being dealt with, but this time vividness of thinking was present, whereas it was not in the previous discussion. In the difference between the two sorts of discussions lies the heart of the whole question of vividness in the classroom and the sort of details to choose.

The difference between the details which bring vividness and those which do not lies in the fact that some produce a clearness of vicarious or imaginative living and others do not. Those details which make for mere cold academic interest have little grip on children's minds. Those details, however, which enable the students to project themselves into the situation they are reading or talking about and become part of it have real efficacy in producing a vividness of imaginative living. Some time ago the *Saturday Evening Post* published a picture depicting in one corner a boy of about fourteen years of age, with his eyes —and his mind—buried in a book. Between this part

and the remainder of the picture was a shaded line denoting that the major portion of the painting represented the imaginative content of the boy's mind. This latter part showed a knight clad in full armour, carrying a lance and pennon, mounted on a prancing steed with a fair damsel riding *en croupe* behind. The face of the knight was the face of the boy who was reading. The artist of this picture was portraying the idea we are discussing. This book was so vivid in its details of the life of the errant knight that the boy was able really to live the life of the hero about whom he was reading.

What we really need, then, in our classroom treatment of geography, history, arithmetic, and the like is a multitude of details—not mere academic ones, but those which concern the intimate lives of boys and girls and men and women. This is entirely possible in any subject of the elementary school with the exception of the purely drill subjects, such as spelling or penmanship. Geography in its very essence is a discussion of how man finds and supports a home for himself on the earth. History is a record of what men have thought, done, and felt in the past. Arithmetic deals with the way human beings solve their number needs. Literature is perhaps the most human of all the subjects, for it depends for its life upon the extent to which it arouses and enthralls the emotions of the reader.

For confirmation of the above ideas one need only examine those books which children enjoy. Some time ago a novel was published which had been written by a child. Every detail of the intimate lives of

the characters in the story was told with complete and sometimes startling frankness. The Peter Rabbit stories are an illustration. For years authors of stories for boys have recognized the principle under discussion and their books trace every detail in the life of the hero. When teachers learn to follow the clear indications of these illustrations, they will spend more time trying to help children to clothe the abstractions of our textbooks with a multitude of intimate and fascinating detail, and spend less time in trying to drum into the nervous systems of the children the bare and uninteresting facts which will be required by the examinations.

**Summary.** In order to make exercise and drill effective, children should know the reason for the work they are doing and be conscious of its need. All learning may well be divided for the purpose of teaching into that which requires skill or repetitive learning and that which requires associative learning. In the latter type, which is the sort most needed in our elementary schools, a wealth of colorful details tends to produce efficient learning. The details which build up the best sort of mental connections are those which help the child to project himself into the situation about which he is studying.

### Study Exercises

At the time Queen Marie of Roumania came to visit America, a certain sixth grade class was studying about Europe in geography. Since Queen Marie's trip was mentioned so much in the newspapers, the children talked a great deal about it. The teacher asked the children if they could locate Roumania on

the map. They did so. For several days they were satisfied with merely pointing out on the map the whereabouts of the Queen. Soon, however, the children suggested that they make a record of her journey, using pins on a large map to mark her course. During the course of her trip the children read much in newspapers and books about the countries through which Queen Marie passed. They made a large booklet in which they pasted the pictures from the papers. The teacher, who had traveled in Europe, was able to supply many intimate and interesting details about the route the Queen traveled. The work reached its peak when the class as a whole helped to welcome Queen Marie to Washington.

1. Is the drill on map locations in this activity of the repetitive or of the associative type?

2. To what degree do you consider that these children saw a use for their drill on map location? Do you think that the children considered this work drill in the "mere drill" sense of the word?

3. Enumerate the possible sources of details in this study. Do you believe that the learning of map locations was aided or hindered by the detailed study of the trip? Defend your answer.

4. The children at times seemed almost to be taking the trip with Queen Marie. What is such an attitude on the part of the learner termed? How does it assist learning?

5. List some of the types of detail in which these particular children probably were interested.

6. Can you discover exercise of valuable learnings other than map location that would come through this unit of work? What use could be made of the following:

| | |
|---|---|
| reading | history |
| composition | art |
| arithmetic | popular science |

In another classroom situation the children were supposed to study South America next, according to the course of study being followed. The teacher, wanting the suggestion to come from the children, decided that a study of cocoa would introduce the subject effectively. She, therefore, placed many pictures concerning cocoa about the room and then had a party for her children at which she served cocoa. She was intensely delighted when a child suggested that they study about cocoa next.

7. In which of these two units of work do you consider the approach more reasonable? Why?

8. Is the latter approach necessary in order to insure that children know and understand the reason for the work they are doing? How did the teacher in the first instance know what her children were eager to study? Criticize or defend the first teacher in initiating the map study herself.

9. What bearing on the sincerity of the teacher-pupil relationship do you see implied in these two cases? Which teacher is more likely to have her children's confidence.

10. Describe a classroom situation in geography in which the children would see the reason for and wish to drill on facts. Can you use to advantage:

Lindbergh's flights?
Byrd's expedition?
Cross country airmail service?

# CHAPTER IX

## EFFECT IN THE CLASSROOM

**Effect as a thermometer which indicates how successfully the other laws have been utilized.** In the psychological term *effect* we have another word which seems at first obscure in its meaning. Like the word exercise, however, it is really descriptive of its nature for it has to do with the effect of the two previous steps in the learning process on the mind of the learner. Some teachers prefer the more descriptive title of the law of satisfaction or dissatisfaction, since these terms state what really happens in the learner. The expression, law of effect, however, is a simpler one to use, and it is, therefore, accepted in this book.

As has been previously stated, the law of effect is very closely related to that of readiness. The two are correlative, for when readiness is present and when exercise satisfies the readiness, satisfaction is sure to follow; whereas, if readiness is not present and exercise is forced, dissatisfaction is the result. In a like manner, when readiness is present and exercise is denied, dissatisfaction again results. Effect, therefore, constitutes a sort of thermometer which measures the effectiveness of the application of the other two laws. Teachers need not necessarily strive to achieve satisfaction on the part of their students. If the teacher directs his mind toward winning a true state of *readiness,* and then follows it up with the

right kind of *exercise*, the thermometer, *effect*, is sure to register satisfaction.

On the first cold day of autumn when the householder decides that a fire in the furnace is necessary, he is not primarily interested in the record of the thermometer as he lays and tends the furnace fire. He is sure that if the fire is properly built the thermometer will rise. His thermometer is simply a test of the effectiveness of his ability to handle the furnace. After the fire is built, he may watch the thermometer in order to determine how successful his efforts are.

In the same way, in the classroom the teacher has the notion of effect in the background of his mind all the time but he does not consciously set out to secure satisfaction. He uses it as a measuring instrument to determine how effective has been his application of the other two laws.

**The problem of understanding the meaning of the thermometer reading.** However simple reading a measuring instrument may seem, it frequently happens that interpretation of its indications is not so easy. The person who runs the furnace does not necessarily maintain, because his thermometer registers a considerable degree of warmth, that the furnace is being efficiently run. He may be burning up too much coal, or he may not have so taken care of the humidifier of his furnace that the air is sufficiently moist. Moreover, if the thermometer registers a low degree of temperature, that fact does not diagnose the reason for it. It, therefore, behooves us as teachers to ex-

amine our readings of the effect thermometer so that we may know how to interpret them.

If we look to experiments on animals to determine how to read our thermometer of effect, we will find ourselves as disappointed as we were in our study of readiness or exercise. The sort of satisfaction resulting from such experiments as have been performed has been on the same brute level as the readiness and exercise. It has consisted in mere joy of escape from an unpleasant position or in the satisfaction of the baser appetites. It is the sort of satisfaction experienced by the small boy who has been good for a day and has been given a stick of candy to celebrate the event. Such satisfaction is capable of little richness of interpretation to help the teacher in her management of a classroom of boys and girls.

Even though the thermometer of effect shows a high degree of satisfaction, we cannot be sure that the teaching process has been entirely good, for it may be the sort of satisfaction which seems to say mentally, "Thank goodness that is finished; we won't have to do that again."

**The meaning of dynamic satisfaction.** A few days ago the writer visited a class in reading in the third grade. The period was devoted to oral reading on the part of the children, of selections made by themselves from some of their books. At the end of the period some of the children had not yet had a chance to read, while others had read only a part of what they would have liked to have read. Some had been much impressed by excerpts read by others and were most

anxious to secure the whole book and to read it through. The children had thoroughly enjoyed the period and were exceedingly eager for another like it.

In this scene lies the paradox of the law of effect. The right satisfaction after an interesting experience is a condition of semi-satisfied dissatisfaction. The children have enjoyed what has taken place and have been partially satisfied by the activity in which they have engaged. But at the same time they feel that there are many more interesting things to do, and, therefore, they are in a state of readiness to perform them. The important thing, then, about the right sort of satisfaction is that it is a dynamic force urging and directing pupils into productive experience in the future. It is this idea which the modern philosopher of education has in mind when he speaks of activity leading to further activity. The dynamic satisfaction says in effect, "That was a most interesting experience; I want some more of the same sort in the future."

Sometime ago the writer was presenting this point of view to a college class in education. One of the members of the class objected. He said, "Several years ago when I was a youngster, I wanted to go to Europe. My people could not afford to send me, so I went over on a cattle boat. I had to nurse sick cows all the way over on that boat. I would not have missed the experience for anything, but I would not want to do it again. If what you say of the law of effect is true, then my satisfaction with the trip should have made me want to do the same thing over again."

This student was misinterpreting the facts. It is not that satisfaction makes one want to do the same thing over again, but it does make one want to have other similar experiences. Let us consider briefly what this man really learned. He learned to endure discomfort for an end which he thought was worth while, and his satisfaction was that which comes of attaining an end through hardship. From my knowledge of this student I know that the satisfaction achieved on this particular voyage did lead to the formation of a character which wished again to endure hardship, if need be, for the sake of achieving a worth while purpose. His illustration, therefore, so far from disproving the main contention of the dynamic character of effect, was actually excellent proof of it.

**Failure to secure good effect.** Let us now suppose that satisfaction is not in evidence in the classroom. Let us suppose that the children manifest a dissatisfaction with their work and a disinclination to pursue similar tasks in the future. What is likely to be the cause of it?

Sometime ago the writer observed a class in geography. The teacher first held up a piece of cork and then one of linoleum and asked the pupils what the objects were. They told her. She asked them why she put these two objects together. They made the natural inference that linoleum is made from cork. She asked them if they knew where cork comes from. One of them made the answer that it comes from Spain and Portugal. The teacher told them then that they were to study next about Spain and Portugal and

asked them to read in their texts in order to find out what they could about the production of cork. She also told them that they would be interested to find out in their reading what kind of people live in the Iberian Peninsula and how advanced they are in civilization. She gave the pupils a chance to read for fifteen or twenty minutes and then conducted a discussion of the material read. The children had been much interested in cork and linoleum before they began their reading, and, when the discussion was opened, all of them wanted to talk about what they had found out in their texts concerning the production of cork. The teacher, however, insisted on their discussing the kind of people who live in Spain and Portugal, in accordance with her suggestion before the study began. A growing dissatisfaction with the discussion was evident, and toward the end of the period it was decidedly pronounced. The effect thermometer registered a low degree of satisfaction.

Let us examine the classroom situation to determine what was wrong. The teacher's use of the linoleum and cork was definitely for the purpose of establishing readiness in the minds of the children, but when it came to the exercise phase of the work, both in the reading and in the discussion, the teacher tried to turn the readiness from what she had originally established into something else. Dissatisfaction was the result. It will always be the result when the teacher starts the children in one direction and then tries to change the direction after the activity has begun. In this faulty articulation between readiness and exercise is found the most pregnant possibility

for dissatisfaction. Again and again the writer has observed lessons in which the teacher has used devices to stimulate interest and then has tried to turn the interest after the readiness was established. Disaster has usually resulted.

It is exceedingly important, therefore, when the teacher is planning for stimulation of readiness to make sure that the exercise through which she is planning to lead the children is a definite satisfaction of the readiness she has established.

It is obvious from previous discussion of readiness that dissatisfaction will always result if readiness has not been established. One further fact must be noted. If the exercise consists of long periods of uninteresting work without any restimulation, dissatisfaction is almost sure to occur. The teacher should be on the watch every minute during the recitation period, and just as much during the study period, to note evidences of dissatisfaction, so that restimulation may make possible a satisfactory operation of the law of effect.

**Increasing effect by a judging period.** A further point with regard to effect needs to be noted here. Many people have found that when they have finished with a given piece of work they are somewhat at a loss to know how well it has been done. The judgment of others, and especially of those whose opinion he respects, brings to any one a satisfaction or a dissatisfaction with his work, which would be impossible without this combination of opinions or judgments. After visiting a classroom, the writer has frequently had the experience of discovering in a sub-

sequent discussion with the teacher, that she is quite unaware of some particularly fine point of technique in her work. Such unawareness might mean that this sort of technique might not again be repeated, whereas, since he has called it to her attention, she will find it natural to repeat the process on other occasions. In other words, the discussion produced a satisfying effect through bringing to the consciousness of the learner a point of excellence which had been unnoticed.

In the same way one may be well pleased with a particular piece of work until its bad points are called to his attention. In this case annoyance might not have been present had not the learner secured the judgment of another. Dissatisfaction with the result will militate against the repetition of the particular errors to which the learner has had his attention called. In other words, the law of effect may be much intensified through critical judgment and reflection.

This fact is of vital importance in the classroom. After every unit of work has been completed, a judging period may well be introduced. In this period the teacher and children together decide what parts have been well done and in what respect this excellence has been shown. They also discuss the poor points of the work, and dissatisfaction is thereby attached to poor or incomplete work. Thus, while the teacher does not definitely set out to secure effect in a given study process, except as she attempts to provide satisfactorily for readiness and exercise, yet she can heighten its effectiveness through well-planned and

critical judgment of the work that has just been finished.

Let us take an illustration. A class has been studying the economic consequences of the industrial revolution in America. They have made a graph showing the increase in production over a period of years and have some pictures to illustrate the change from the home as a unit of manufacture to the factory. They may well take time before starting on another topic to discuss how satisfactorily this graph expresses what really took place, and what further diagrams might have been possible and helpful to indicate changes.

**Summary.** Although a teacher may not consciously set out to apply the law of effect in his work, he watches its operation carefully, for it serves as a thermometer to gauge the effectiveness of the operation of the other laws. The best effect is a dynamic sort of satisfaction which leads into readiness for further study. If satisfaction is not achieved, even though readiness seemed to be present at the beginning of a unit of study, a very likely reason for the situation is a faulty articulation between the readiness and the exercise of the class. The efficiency of the operation of the law of effect may be much increased by a period of careful judging of results when a section of the work has been completed.

### Study Exercises

A teacher wished to teach her sixth grade class percentage. She asked the children to watch the newspapers for advertisements of bargain sales. These advertisements were brought

to class. During the recitation the clippings were read and discussed. The amount saved on various articles was computed. The teacher showed the children how to compute the per cent saved and the per cent of reduction. At home the children discussed with their parents purchases they had made. Soon they became interested in computing the per cent lost or gained in buying on the installment plan. They computed this for things they were actually interested in buying—radios, bicycles, etc. This led naturally into a discussion of savings accounts and bank interest.

1. Discuss the degree to which "activity led to further activity." Make a diagram showing how the satisfying uses of one activity led into a new activity. Extend your diagram beyond the description of this activity to other activities that might grow from these.

2. What is absolutely essential if one activity is to lead to another desirable activity?

3. Do you see a corollary in undesirable activities that would lead to further undesirable activities? Describe such a case. Be sure to note the types of satisfaction involved in the leading on.

4. How would you rate this teacher's articulation of readiness, exercise, and effect in this activity? Can you tell some ways in which she might measure objectively the effects of the various activities?

5. What could you tell of the readiness and effect aspects of a classroom by the various material things in it?

6. Some supervisors say that they do not need to see the children at work; the things in the room are a good indication of the children's interest in the work going on. Defend or criticize this point of view.

7. Look back at page 31 for a contrasting situation. Compare the effects of that activity with this one.

8. Do you think there is always some effect from every

activity? How are life attitudes built? What does mental health demand here?

9. How important are these effects in building the permanent character of pupils? Can you trace certain traits of your character to satisfactions or annoyances of your childhood?

10. What general statement about effect in the learning process are you willing to make on the basis of the considerations above?

# CHAPTER X

## FUSION OF THE LAWS OF LEARNING IN THE CLASSROOM

**The danger of confusion to the classroom teacher in the psychologist's simple statement of the laws of learning.** As stated by the psychologist, the laws of learning seem very simple because they are usually applied in his illustrations to exceedingly elementary units of learning. He describes the process of having a rat learn his way through a maze, for example, or a kitten learn how to escape from a puzzle box. In the learning of boys and girls, however, we are seldom confronted with such simple situations except in the purely drill aspects of the elementary school, such as spelling, penmanship, or the acquisition of number facts. If one examines either a lesson while it is going on in the classroom or a stenographic report of one that has occurred, he will not find it very easy to separate and study the three laws of learning as they are applied in the school. So embedded are they in subject matter that he will be likely to doubt whether a knowledge and understanding of them is of much real assistance in actually planning or judging a recitation. In other words, in the stress of actual classroom experience the application of the laws becomes fused, and all three merge into one another in a rather bewildering fashion. It may appear then as though this book describes the working of laws as if they

operated in isolation, when as a matter of fact they never do.

In the older type of recitation characterized by rapid fire question-and-answer reproduction of the textbook, little or no attention was paid to readiness, and a "That's right" or "good" from the teacher constituted the only application of effect. The bulk of time and effort was focused on exercise largely in the form of drill. A thorough knowledge of the laws of learning is of little value to a teacher using this form of class work. But with the advent of a different point of view as to the function of the recitation, great possibilities for progress through a study of the psychology of learning are revealed. Let us see how this is true.

**The present emphasis on larger units of work.** The entire trend of elementary education in the last three decades has been toward the adoption of larger units of thought and study in the classroom. The older form of recitation was characterized by the scrappiness of the material presented. Individual facts and ideas were recited in response to questions of small scope by the teacher. Progress in our schools, however, has been toward directing the child's thought to large questions and purposes. For example, the writer knows of a class that has been working for several weeks on the question: How can the industries of Peru be stimulated to produce future progress in that country? Another class is working on the question: What effect did the industrial revolution have on the growth of our nation? Another may be working on the problem: What are the char-

acteristics of a good sonnet? The fourth grade of the Horace Mann School has recently been engaged in a study of the life of the ant. Such units of thought as these cannot be completed in a day or two days; they may extend over a period of several weeks.

Since today we are thinking in the elementary school in terms of larger units of work, it is quite natural that we should also think in terms of various phases of study and learning. It is here that a thorough knowledge of the laws of learning may make its contribution. In connection with any one of the problems given above, one may divide the total study into a readiness or stimulation phase, an exercise or learning phase, and an effect or judging and appreciation phase. This does not mean, of course, that any one of these phases exists in so pure a form that only the law in question is being applied. It simply means that there are certain characteristics of each stage which are likely to be prominent while the teacher's attention is centered chiefly on applying that particular law of learning.

**The dangers of too rigorous an interpretation of the laws.** It is, however, a serious misapprehension to think of these phases of learning as existing in the progress of any unit of work in a pure and non-overlapping form. This misconception has had in the past, in some classrooms rather serious effects. Teachers have seemed to believe that there must be a period in the learning process on any one topic when the children are stimulated, but neither learn nor reach any conclusions; that they must then collect data and learn without receiving any stimulation or

arriving at any conclusions; and that, finally, they must reach conclusions without at the same time experiencing stimulation or engaging in learning activities. This is a complete misinterpretation of the facts. No one learns that way in real life. One is stimulated for a minute or two, perhaps, along a certain line. He finds out the answer to the question in his mind and then perhaps temporarily passes on to other things. Another stimulus along a kindred line later impinges on his consciousness. He studies for a short time and again reaches a conclusion. After a number of such experiences dealing with a certain topic he realizes that he must really make a serious study of this whole topic. Then he plunges into a phase of his work which is largely thinking, organization of material, memorizing, and gathering more data. During all this time, however, he is being constantly restimulated by the finding of new data which raise new questions. His conclusion is again frequently a stimulus toward future sound work and research.

**An illustration of how a lesson may be centered on one law but contain elements of the others.** As an illustration of how an entire lesson may be centered on the application of one of the laws of learning while at the same time the other two are in evidence, let us consider a lesson in science which the writer observed a short time ago. The children were having their second lesson on ants. They had previously made something of a study of bees, and their familiarity with some of the conceptions of insect life was revealed during the recitation period by their comparisons of ant and bee life.

At the beginning of the lesson the teacher set up at the front of the room a large card bearing a number of questions about ant life, as follows:

1. How do ants build their homes?
2. How do they get their food?
3. How and why do ants lift and carry loads bigger than themselves?
4. Why do we sometimes call an ant hill an ant city?
5. Do ants have eyes?
6. Can ants understand each other?
7. Does an ant hill have a queen?
8. What is her work?
9. Why do some ants have wings?
10. Do the male ants do any work?
11. How are baby ants born?
12. Do ants need water to drink?
13. Are ants warlike?
14. Do ants sleep in the winter?
15. Are there ants in every part of the world?

The teacher began the lesson by asking the children whether there were certain questions on the card which they could answer immediately without study. Numbers 5, 7, and 13 were answered at once by some of the members of the group. The teacher then led a discussion on the subject of the different kinds of ants, and put on the board the classification into drones, queens, and workers. The class talked about the way in which the queen and the prince are carefully guarded by the workers up to the time of the nuptial flight. The teacher described in detail how

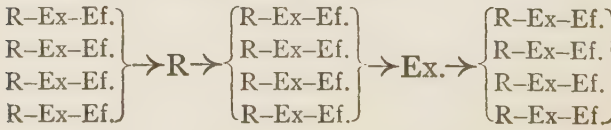
the new queen starts to make her nest so that she can produce a new colony. The children had a number of pictures of ants and different books on the subject, which the teacher allowed them to pass around so that all might see what a worker, a queen, and a drone look like. The teacher told the children in detail about the underground chambers of an ant hill, about how the little ants are hatched, and later how they spin their chrysalis, and how they are cared for after they emerge. She told how the top of the ant hill furnishes an oven for warming the eggs during incubation. She also gave a most interesting description of how the ants use the aphis as a sort of cow to supply nourishment for themselves and the young ants. The children seemed particularly interested in hearing about how the ants milk these strange cows. The lesson closed with another checking of the chart for those questions which had been answered. Numbers 1, 4, 8, 9, 10, and 11 were checked, and the teacher passed to the children books which would help them in their study of the remaining questions.

If the purpose of this lesson were misinterpreted, it would be called a poor lesson. Much inexact information was present, and there were many questions which were not cleared up. Little learning of the active sort seemed to be taking place. The teacher talked at least three-fourths of the time, and the children were frequently passive listeners. To be sure, they seemed much interested in what the teacher told them, but their actual participation in furnishing ideas for the class work was comparatively small. A supervisor might be rather severe in his criticism of

the lesson on the ground that little sound and effective learning seemed to have taken place.

No one recognizes better than the teacher in question, the necessity for providing in the learning process for the organization of ideas, for repetition, for opportunities for doing as well as for hearing, and for initiating and carrying through individual purposes. But this teacher was planning to spend probably two weeks on the study of ants. She realized that the stimulation which would satisfactorily carry a class of fourth grade children through two weeks of study on one topic must be very pronounced and deep-seated. One can stimulate a class to study ants simply by bringing an ant into the classroom and talking about it for a few minutes, but such stimulation would probably prove totally inadequate for carrying the interest through a two-weeks' study. The teacher recognized this fact and realized that the only stimulation which really produces long continued study-results is the stimulation which comes from acquaintance with a considerable body of truly interesting material. Learning of facts and satisfaction with such learning were both present in the recitation, although stimulation or readiness was the teacher's chief aim.

In Chapter VI, page 83, there is a diagram showing what really happens in a lesson to secure readiness. This diagram may be extended for the other phases of learning as follows:



This diagram simply means that although looked at in the large, the study process on any one topic should have a readiness phase, an exercise phase, and an effect phase, yet all three laws may be in evidence in any phase of the process. For example, in an exercise lesson one would expect constant restimulation through reference to the original source of readiness, and frequent satisfaction with the acquisition of a bit of skill or the contribution to the class of an important factor in their discussion.

**Major characteristics of a readiness lesson.** In order to guide his management of class exercises in accordance with this point of view, it behooves the teacher to be familiar with the major characteristics of the three sorts of lessons. From a study of the lesson described above, we may derive the major characteristics of a lesson for stimulation. There is likely to be a good deal of teacher activity. The teacher will probably be in charge throughout and will guide the attention and mental activity of the children almost completely.

A second characteristic of the readiness lesson is the probable lack of orderliness in the presentation of material. There may be little organization of the ideas into definite form. The children will be, so to speak, nibbling at or testing the subject matter. The material which the teacher uses will be of highly interesting form. Pictures are of great value in this phase, as are also models, maps, diagrams, and the like. The presentation of the material may lack greatly in system. This is the easiest kind of lesson

for a supervisor to misjudge. No type of lesson, however, is more important than this type.

**Major characteristics of an exercise lesson.** When the children pass out of the stimulation or readiness phase, a very different type of activity should be characteristic of the exercise phase. There will be far more activity on the part of the children; in fact, in many of the recitations they may be in almost complete charge. The activity most characteristic of the exercise phase will be an attempt at organizing the material for the solution of the problems determined in the readiness phase. There will, therefore, be a greater orderliness in the discussion and presentation of the facts and ideas which are being dealt with. The making of outlines, of diagrams and charts, the use of reference books for the collection of data, the manufacture of models, and the use of handwork projects are all characteristic of and valuable in the exercise phase.

**Major characteristics of an effect lesson.** In the third phase of the work; namely, effect, the characteristic activity is a resumé and summary of what has been learned and accomplished. The children judge their work, estimating how satisfactorily they have solved their problems. Moreover, appreciation is likely to be prominent during this phase. The children are enjoying the results of their labor. Not long ago the writer was in a first grade class where the children had finished making a model of the vehicular tunnel under the Hudson River. The stimulation phase and the work and learning phases were over. They were enjoying their work. The tunnel had two

parts to it, one for east-bound and the other for west-bound traffic. Entrances and exits were carefully marked and, on the occasion of the writer's visit, the children were busy making trips under the imaginary river with their automobiles and trucks. The liveliest kind of satisfaction was evidenced by all of them.

**Summary.** Because of the complexity of the learning situation in the classroom, the laws of learning become fused or blended so that it is difficult to distinguish one from another. Modern education, however, is thinking in terms of large units of subject matter, and with these it is possible to provide for a readiness, an exercise, and an effect phase. In each of these, all three laws will be at work, but the teacher's primary purpose is centered on one of them. A lesson during any one of the phases is marked by certain more or less definite characteristics, such as concrete material for the readiness phase, organization for the exercise phase, and judgment, appreciation, and enjoyment for the effect phase.

### Study Exercises

A group of first grade children became interested in having a garden in a vacant lot next to the school. They brought seed catalogues to school. They figured the cost of the seeds they wanted to plant. They learned to use a ruler and yardstick in finding out how high different varieties of flowers grow. They drew a plan of the garden, writing in what they expected to plant in each row. They gave an entertainment to raise money to have the ground plowed and buy the seeds. They did the hoeing and raking themselves. When the seeds came, they planted them, each having a chance to do some of the planting. The children took many of their recess periods to weed and

water the garden and keep the soil loose. Eagerly they watched the things grow and took turns in taking home flowers, radishes, and other things as they were ready.

1. Outline a large readiness, exercise, and effect phase in this gardening activity.

2. In each phase give an example of the complete cycle of readiness, exercise, and effect in a specific instance. Your illustrations will bear the relationships shown in the diagram on page 144.

3. In this conception of fusion of the laws of learning, how does the conception of activity leading to further activity enter? Show graphically the relationships of the effect of one activity to the readiness of another activity within one large unit of work.

4. At any place in this garden activity can you single out a phase of learning (readiness, exercise, effect) that was functioning alone? You will have to take account of the physiological changes that accompany learning in your answer.

5. Do you consider the laws of learning as essentially descriptions, or explanations of the learning process? If you accept them as descriptions, could you still apply them in improving teaching, even though you were forced to reject the S→R bond theory?

6. Plan in very broad outlines a unit of work which you would like to try with children. Chart the activity in the form of the diagram on page 144 giving only the number of detailed activities suggested by that diagram.

## CHAPTER XI

# RELATION OF THE LAWS OF LEARNING TO DIRECTED STUDY

**The modern emphasis on the importance of a child's study activities.** The last thirty years in American education have seen an ever increasing interest, on the part of all who have to do with the elementary school, in the problem of teaching children how to study. The impetus to this movement is attributable, in the last analysis, to the change in point of view with regard to child psychology, which we have discussed earlier in this book. But the one person who has perhaps contributed most to the interest in the subject is Professor Frank M. McMurry. His epoch-making book, *How To Study and Teaching How To Study,* published in 1909, marked one of the early stages in the interest on the part of the educator in the subject; but in public addresses as well as in classes Professor McMurry had been stressing the matter for several years previously, and had convinced his many hundreds of students of the supreme importance of so directing the learning activities of children that right habits of study might be the result.

**Directing study not an administrative problem.** As Professor McMurry has repeatedly pointed out, the study process is an extraordinarily complex one, and the genius of the American people is such that when confronted with a difficult problem they try to set up an administrative machine to solve it. Before

everything else, Americans are organizers. It has been stated that if three Americans fell out of a balloon, before they reached the ground they would have elected a president, vice-president, and secretary, and would have resolved themselves into a committee of the whole to decide what to do when they landed. This organizing spirit has expressed itself in relation to the question of how to study, and a large number of administrative schemes and devices have been confidently put forward by their inventors as the final solution of the study problem. Of course the fact is that they do not solve the problem at all. In a bulletin of the University of Illinois, Mr. William Arthur Brownell has pointed out this fact as follows: "In educational literature, the technique of administration—distribution of time within the period, disposition of the recitation, and the like—is much discussed, while matters regarding the actual help in study, which is the reform demanded, receive only incidental treatment. The 'side show' has swallowed up the 'main show.' "[1]

In this bulletin Mr. Brownell discusses fourteen different plans for supervised study, all of which are essentially administrative in character and of very little help to the average teacher, who has no authority to adopt any particular form or plan of supervised study.

**Study is a function of the total teaching process.** The trouble with most of the schemes for supervised study lies in the misinterpretation of the relationship

[1] W. A. Brownell, *Research Bulletin No. 26* (Bureau of Research, Univ. of Ill.), p. 134.

between the study period and the recitation period. The conception of the originator of these administrative devices seems to be that the recitation period is the time when the teachers hear lessons, test the knowledge of the pupils, and then assign the next chunk of subject matter to be memorized. With such a conception of the teaching process, such administrative schemes may prove reasonably effective, but they are entirely out of step with the modern thought on the purpose of the recitation period. We have repeatedly emphasized the idea that the good recitation is one in which thinking and learning are constantly going on. Study is not a process reserved for the home or the study hall. One cannot isolate the study period and make any truly productive plans for it apart from a consideration of the method of the recitation. It cannot be too strongly emphasized that *study is a function of the total teaching process.* Every question which a teacher asks, every response from the children, every sort of use of textbooks or maps or diagrams or illustrative material tells the pupils the kind of study which the teacher wants. For example, if the teacher's questions are unrelated to each other and require an individual fact as an answer, he is definitely teaching the children that the best way to study is to acquire as many isolated facts as possible. If one textbook is always referred to by the teacher as the final answer to all questions which arise in the class, the teacher is definitely establishing the rule of study that one must always believe exactly what he finds in a book.

The study process, then, cannot be isolated and

dealt with apart from the recitation; the two are correlative. When one thinks of the learning process as a whole, he sees that this must be true, for in the last analysis, study is learning, and learning takes place in the classroom as much as in the study hall. The laws of learning, then, must be the laws of study, and this book, therefore, is as much a discussion of the direction of study as it is a discussion of the direction of children's learning.

In his book on study, Professor McMurry gives eights factors in study. They are as follows:

I. Provision for Specific Purposes.
II. The Supplementing of Thought.
III. The Organization of Ideas.
IV. Judging of the Soundness and General Worth of Statements.
V. Memorizing.
VI. The Using of Ideas.
VII. Provision for a Tentative Rather Than a Fixed Attitude Toward Knowledge.
VIII. Provision for Individuality.

If one examines these for a minute, he will note that all of them have been discussed, perhaps under different names, in this book. Number one, Provision for Specific Purposes, is simply another name for readiness. Numbers two, three, four, and five are different factors in the operation of the law of exercise. Numbers six and seven definitely concern the operation of the law of effect as discussed in the previous chapter. Number eight is perhaps not a special factor so much as it is a condition of all of the other seven.

**The twofold nature of directing study.** There is one point in this question of directing study, however, which is of supreme importance. As an illustration of it, let us consider the situation of a motorist whose automobile has broken down on the road. The motorist, we will say, is not a skilled mechanic, and instead of trying to repair the machine he calls up the garage at once and the garage sends out a repair man. The first thing the repair man will probably do is to ask the motorist how the car behaved when it stopped. He will then locate and repair the trouble.

Let us suppose that the motorist is anxious to know just how the repair man diagnosed and repaired the difficulty. We can imagine the repair man telling him about it somewhat as follows: "To begin with, you told me that the motor stopped dead. That largely ruled out any trouble with the gasoline supply. When there is anything wrong with the carburetor or the gasoline pipe, the engine will probably stop, but it will back fire and splutter considerably before it finally dies. When something goes wrong with the ignition, however, the car will probably stop at once. Since you said that the engine stopped dead, I was pretty sure that the thing to look for was trouble in the electric system. You will remember that the first thing I did was to step on the self-starter. It worked all right, therefore, your generator and starting motor were O. K. Then, you will remember, I asked you to get into the car and step on the self-starter. While the engine was turning over, I took a screw driver and short-circuited the top of the spark plugs

on the cylinder head. If the spark plugs were receiving current there would have been a spark between my screw driver and the cylinder head. There was none, so I knew that the trouble must be somewhere between the generator and the spark plugs. The most likely place for trouble to occur is in the distributor. I, therefore, took off the distributor head and found some water in the lower part of the distributor box. I dried up this water with a piece of cotton waste, and then your car started."

Let us suppose that the motorist understands the parts of his car and is able to follow the reasoning of the mechanic, step by step. In that case the motorist has been led through a series of thought processes and to a considerable degree he has done some good thinking. The real hard work, however, was done by the mechanic. The motorist has learned how to diagnose the particular trouble which happened to occur in the particular incident described, but he has not learned much about how to diagnose trouble in general. In other words, he has learned how to do a particular task, but he has not become acquainted with the general principles of diagnosing motor ills. To the extent that the repair man made himself clear to the motorist, he was doing good teaching, but his teaching fell short of the best sort of directing study because the motorist learned so few of the general principles which govern the diagnosing of motor trouble. The motorist was learning certain definite things about his motor, but was not acquiring much knowledge about how to learn.

Directing study, then, is a twofold process. It

consists in part of so directing children's learning activities that facts and ideas may be efficiently acquired, but, also, at the same time directing study must embrace the function of teaching children how to learn.

Naturally the question arises as to whether, if children are led through good study processes by the teacher, they will not learn best methods of study simply through habit. They may, to be sure, acquire certain little techniques which will be of considerable assistance to them. But we must not forget that habits are very specific. We may have formed correctly the habit of tying our shoes, but this may not have taught us anything about how to study and learn to tie a bowline. The kind of study habits which we really want in addition to the smaller and more mechanical techniques are those which find their best embodiment in general as well as in specific principles. Let us consider briefly how these general principles are learned.

Suppose I want to teach a little child the meaning of the word *round*. I hold up a half dollar and tell the child that it is round. If that is as far as I go, he will associate with the idea of round not only the shape of the coin but also its other qualities, such as color, hardness, and the image stamped on it. I want him to abstract the idea of roundness from the qualities of the coin. I therefore call his attention to the clock and tell him that it is round. I pass my fingers around the face of the clock, saying "round" as I do so. I then call his attention to a rag rug and tell him that it is round, and again show by gestures the

idea of roundness. Perhaps I then call his attention to my ring, telling him that it is round, and again passing my fingers around it to show what I mean. Eventually out of all of these specific illustrations he will learn the idea of *roundness,* and will recognize this characteristic in round objects other than those used in learning.

**Establishing principles of study.** Mere application, then, without having the attention called to the principle involved, will not insure application of the principle in another situation. A number of years ago Professor Bagley performed an experiment with school children which illustrates this idea very clearly. With one group of students he stressed the idea of neatness in their arithmetic papers. With an equivalent group he stressed the idea of neatness in arithmetic papers and in addition brought very forcibly to their attention the ideal of neatness. In the case of the first group the arithmetic papers improved immediately, but the language and history papers were just as dirty and poorly arranged as they had always been. With the second group not only was there an improvement in the arithmetic papers, but in addition all the other papers handed in by the children showed improvement. The ideal of neatness had been abstracted or, so to speak, torn loose from its specific application and had become general.

To summarize, the process of directing study is first a process of leading children through a rich and varied application of the laws of learning, and, second, of raising the general principles of study to the level of consciousness so that the children will not

only do good studying but will also have a distinct conception of the study purpose behind the things that they are doing.

Let us take an illustration. The writer saw a lesson in fourth grade history in which the teacher had an excellent opportunity to make conscious in the minds of the children a principle of study, but, unfortunately, she failed to do so. The children had been studying the early history of Manhattan Island and had decided to make one corner of their room a Dutch Colonial corner. In planning for the arrangement of this corner, they had decided that pictures of the early history of New York City would be in order and that it would be a good plan for them to draw these pictures themselves. They had consulted numerous reference books for interesting word pictures and were preparing for the visit of the art supervisor, at which time they would receive help from her in the actual production of the pictures. The teacher spent the period in having the children read the word pictures and in having them make sketches of the way in which each individual child would like to draw his picture. She then instructed the children to write on the back of the sketch the particular help which they would like the drawing supervisor to give them. If one generalizes the principle of study which this teacher was putting into operation, it would read somewhat as follows: Before I consult an expert, I should know, through preliminary study, exactly what help I want from him. This is a thoroughly sound principle of thinking and many a doctor, lawyer, or college professor would be very grateful, in-

deed, if all the people who came to consult him would act on this principle. The teacher had led the children through this very sound procedure but had not made conscious in their minds the general statement of the principle as one which they would do well to observe in all of their work.

The writer saw another illustration of this same thing in a fourth grade arithmetic class. The children were making reports from collateral reading books, and one of the children, who had read a book containing information on all of the contributions which the other children had made, was careful not to repeat any of the things which the others had said, but merely to add to them the further details which he had discovered in his reading. In commenting upon his contribution to the class work, the teacher praised not only the material which he had presented but also the fact noted above. She said to the children, "John's recitation was exceptionally good, because of the fact that he did not repeat what the rest of you had said. In any discussion it is a fine thing to be able to add something to the things which the other people are thinking about, without repeating the things which they have said." This teacher was making conscious a principle of group study and in that way helping to make it transfer to other situations of a similar nature.

It is true that one statement of the principles involved in the lessons described would not make the principles of study a real part of the mental equipment of the children. But frequent reiteration of

them in different situations would succeed, as in establishing the concept of roundness, in tearing them loose from their particular situations and in making them a part of the child's store of permanent attitudes.

One would not expect, in following the daily work of an individual teacher, to find such principles appearing every day or in every recitation. The teacher, however, who is really teaching his pupils how to study will be found to be developing many such principles in the work of a month or a year.

**Summary.** The need for teaching children how to study has been much stressed in recent years, but effort along this line has too frequently been directed toward administrative devices and schemes. Teaching to study, however, is not a matter of administration but is a function of the total teaching process. As such it has been prominent throughout this book. Teaching to study is a twofold process; it means, first, the direction of children's efforts into sound and productive study activities; and, second, in making conscious in the children general study habits.

### Study Exercises

1. Following are some examples of study procedure observed in use in elementary grades. In each case write down the one most important idea about study that the children in the situation would be most likely to derive:

A. A teacher used a single text in history. No reference books were used. For any problems or questions raised, the teacher referred the children to the text.

B. In a classroom the teacher permitted absolutely no conversation of any sort to go on among the children during study periods.

C. During class discussions of important problems a teacher always called on one certain child to answer the difficult questions.

D. A teacher insisted that in reading to answer specific study questions, the children should read carefully every word of the chapter in which they found their answers.

E. In another classroom the teacher helped the children make card catalogues of important references; taught them to use the index, table of contents, and chapter summaries in books; and how to make best use of encyclopedias. She also taught them how to skim to find the most useful part of each reference.

2. Give two illustrations, such as the ones given above, which you have observed. State the significant study habits that were being built in each case.

# CHAPTER XII

## LESSON ASSIGNMENTS

**The older point of view on lesson assignments.** No book on teaching would be complete without a discussion of lesson assignments, since this topic is vitally bound up with one's whole conception of the purpose and process of teaching. The change in ideas with regard to any process means a readjustment of all of its functions. There are many implications with regard to lesson assignments in the statements in this book, and it is the purpose of this chapter to bring together what has been said, in an orderly consideration of the sort of assignments a teacher should give.

Under the older point of view with regard to the recitation and to teaching, there was little difficulty in lesson assignments. The problem of the teacher was to be a taskmaster, to make sure that certain bits of knowledge and information were learned by the children. The problem of assigning a lesson simply reduced itself to the necessity of laying out a certain amount of matter to be learned in order that it might be recited in class the next day. The only serious problem confronting the teacher was to assign neither too much nor too little for the average mental ability of his class.

**Characteristics of group study and of individual study.** In the preceding chapter it was contended that teaching to study is a function of the total teach-

ing process. If this be true, teaching children how to do group study of a group assignment is going on all the time in a good recitation period. But one must keep in mind the fact that however good group studying may be, there are certain learning functions which may be carried on much better by individuals than by groups. To be sure, it is difficult to make any sharp differentiation between those types of study which are best carried on by groups and those best done by the individual himself. In general, however, we may distinguish three important characteristics of each of the two types of study.

First, the acquisition of skills is likely to be largely an individual matter. Class discussion cannot efficiently train a child in the multiplication table, in the spelling of words, or in long division. Such skill subjects require individual practice in order to attain sufficient facility. Second, fact finding in geography, history, literature, or the like may be efficiently done by the pupil individually. No amount of discussion can decide what is the capital of Alaska or whether the Revolutionary War lasted for five or seven years. The wide use of collateral reading which is characteristic of our modern schools today should involve considerable individual work. Finally, making hypotheses may well be largely an individual function. On the basis of certain reading it is quite proper for the teacher to ask the child to reach certain tentative conclusions which may later be tested during the recitation period.

Turning now to the functions of study which can be performed best in groups during the recitation

period, we must be struck immediately by the fact that the recitation should be used by the teacher for the stimulation of children's work. It seems to be a principle of human behavior that groups may be more efficiently stimulated than individuals. Second, the interpretation and testing of the hypotheses worked out in the individual study periods represents an excellent form of class exercise. Finally, the organization and synthesizing of ideas into larger meanings may well occupy considerable time and be efficiently carried on during group study.

Most of this book has been devoted to a discussion of group study. The present chapter deals almost entirely with the type of work carried on in individual study periods.

**Characteristics of a good lesson assignment.** In the light of our general point of view, what are the characteristics of a good lesson assignment? Two of these may be easily derived from what has already preceded. Since group study should be handled by the teacher in order to produce stimulation or readiness, it follows that a lesson assignment must be in line with such stimulation and, therefore, must be interesting. Second, the lesson assignment should grow out of the class work or lead into a future class period, since individual and group study are correlated processes. These two characteristics are so obvious from previous discussions that they need not be elaborated.

The third characteristic of a good assignment was brought out forcibly to the writer sometime ago when he saw a lesson in geography in an experimental

school. The assignment for this recitation had been as follows: To find out whether North America gets more from South America than South America gets from North America. The group discussion on this question was extraordinarily poor, and afterwards the teacher asked the writer what the trouble was. He asked her in return what the answer was to the question she had propounded as the assignment. She answered, "I really do not know, but I thought it might be a good plan for the children to think about the matter." Of course, the children had done practically no thinking. The whole subject was so utterly indefinite that the children had had no notion of what to do and simply wasted time during the period when they were expected to study.

The third principle of lesson assignments, therefore, is that they should contain definite elements, so that children will have some clear ideas as to how to start their work without wasting time in largely fruitless effort. The writer, however, cannot agree with the contention of Hall-Quest that "the assignment is the teacher's marching orders to the class. It can never be too specific."[1]

Such a point of view would make for a deadly dullness in the assignment; and second, it would make no allowances whatever for individual differences in ability and speed of work. Moreover, it would make no provision whatever for individual interests, aptitudes, and initiative on the part of the pupils.

The fourth principle, then, of assignments is that

[1] A. L. Hall-Quest, *Supervised Study* (Macmillan Company), pp. 23 and 143.

they should have indefinite elements as well as definite. Such indefinite elements help to arouse the child's individual drives to action and to make him ready at the time of the recitation to have the soul-satisfying experience of making a real contribution to the thinking of the class. As an illustration of the type of assignment we are discussing, let us take the following: "We are now well started on our work in decimal fractions, but before we go any farther we need practice on what we have already learned. We can get this practice from the examples on page —. Do these as quickly and as well as you can. Then you will notice that the problems on the next page have to do with the problems of the dairy farmer. Being city children, you don't know much about him. See how much you can find out about pastures, cows, milk production, barns, prices of milk, and so on. Our encyclopedias will help and you can find many things of interest in your geography book. Try to answer the question: If I were a dairy farmer, what would my hardest problems be?" As has been stated before, children vary widely in ability and interests. This assignment makes possible an adaptation to such differences. The slow child may have time to do only the examples which are asked for. The bright child has possibilities for further work, which he can bring in as a help to the slower one. He thus learns while he is young to bear a responsibility because of his greater intelligence, in wider service to his group.

**Where should the assignment be studied?** Of late years there has been much discussion and difference of opinion on the question as to where the assignment

ought to be studied. Teachers are recognizing the fact that the conditions of modern life have greatly complicated the problem of home study. It must be recognized that the homes of most of our children are not adapted to good home study on the part of the children. With the advent of the victrola, the radio, and the small apartment of few rooms and little space, a separate room where a child may study in peace and without external distractions has become practically an impossibility. The average home, moreover, has few, if any, reference books which may be consulted for assistance in collecting data. Moreover, most teachers will testify that the help of parents, however well meaning they may be, is likely to do more harm than good. This means that home study is likely to be on a low plane of poor mechanical work and therefore represents a method of disgusting children with study rather than of stimulating them to do more study.

This situation has been recognized in the supervised study movement, and many schools are lengthening their periods and allowing a large amount of time for study in school. Here the conditions for study are right, since reasonable quiet reigns, since reference books and helps to study are available, and since the teacher, a trained leader in study, is there to help. The point of view which this movement represents is sound, but the lengthened periods, such as are described in the Hall-Quest[1] series of books, are an impossibility or, at any rate, are exceedingly difficult in many school systems.

[1] A. L. Hall-Quest, *Supervised Study* (Macmillan Company).

**Caring for both group and individual study in the regular class periods.** It seems to the writer that there is a compromise in this situation, well adapted to the average school, which would feel some embarrassment in justifying sixty to ninety minute periods to the parents of the children. This compromise finds its justification in the conception of modern teachers that their work is not sharply divided into assignment study and recitation. This idea has been suggested earlier in this chapter. The recitation today is thought of not as a time when children disgorge facts which they have previously swallowed, but as a period when teacher and children alike attempt to engage in the best sort of group thinking on the basis of facts and ideas with which they are at that time concerned. Recent experiments have led psychologists to the fairly definite conclusion that a group engaged in thinking on a common problem can arrive at a much better solution than any one of the group could do if working by himself. If this be true, complete individualization of the work of our elementary schools is open to serious question.

There is, however, a limit to the efficiency of group thinking because of the fact that thinking should be based on ideas and facts. The medieval logician might be able to debate for years about the number of angels who could dance on the point of a needle, but the modern child or adult prefers a less metaphysical and more practical use of his mind. One cannot think well in any field without having some facts to think with. It is therefore obvious that if we are to do away with the artificial division of our

school work into recitation and individual study, it will not be sufficient either to abolish the individual study or the recitation. Each has its function, and our problem is not that of destroying either one but of finding the legitimate use of each.

We have stated above that the recitation should be devoted to group thinking and that facts are necessary for such work. It is obvious that when a group is attempting to think, a time is going to come when such thinking will be blocked because of lack of data. In a recent publication of stenographic reports of lessons,[1] a recitation was given in which the children were discussing the question as to whether or not the western part of the United States still represents the land of opportunity. The children had already arrived at certain conclusions in regard to the matter, and the question arose as to whether the West represents the land of opportunity from the standpoint of manufacturing. In such a situation the question cannot be settled by argument. The thinking of the children was definitely blocked; first, because they did not know what elements are vital in making a section of our nation into a manufacturing section; and second, whether or not the West possesses these things. It was obvious, therefore, that further group thinking would have been useless, since there was lack of knowledge and since mere argument would have been a futile waste of time.

In the situation described, it is obvious that the need for individual study was indicated. Let us sup-

[1] *Stenographic Reports of Elementary School Lessons* (Public School Publishing Co.).

pose that an assignment for individual study based on the two points mentioned in the previous paragraph was given. How well would it have satisfied our criteria for lesson assignments? Earlier in the chapter we discussed the idea that fact finding can best be done in individual rather than in group study. The definite elements of the assignment could have been made clear in the group discussion, and indefinite elements might have been provided for in the fact that no one book contains all of the information needed by this class and that the initiative of the children might have been enlisted in bringing to bear on the problem data which were not included in their own text. Since the class study stimulated interest in the question, and since it grew definitely out of group discussion and led into more group discussion, all four of our principles of a good assignment would have been well provided for.

It is apparent, then, that the conception we are putting forward does not countenance sharp division on the basis of class periods into group study and individual study. We should not have each class period devoted entirely to group study followed by a period devoted to individual study. Individual study should begin when group thinking is blocked, and group thinking should begin when the best interests of learning can be served through group thinking. This means that of the five periods of the week which may be devoted to geography, the amount of time devoted to group thinking or to individual study will vary widely from week to week. In some weeks perhaps two and a half or three or even four periods may be

devoted to group thinking, whereas in other weeks the same proportion of time may be devoted to individual study. Under such a plan, class time is not thought of as necessarily devoted to recitation periods, but may be equally given over to supervised study under the direction of the classroom teacher. For example, let us take the diagram below, which might represent the ten periods of a given two weeks devoted to the subject of history. The double line represents group study; the single line represents supervised study. It will be noticed that in some cases the transition from one to the other is coterminous with the recitation period. In other cases it

is not. When such a situation obtains in the classroom, it would seem that all of the conditions, both for group and for individual study, will be satisfactorily met.

**Summary.** Under the older point of view regarding teaching and study, lesson assignment presented few difficulties. The modern conception of the recitation period as a time for group study, however, has made the problem more difficult and requires an analysis of study activities into those which are best carried on individually as distinguished from those best pursued in class study. The former type may involve the acquisition of skills, fact finding, and the making of hypotheses. The latter may include stimulation, interpretation, and testing of hypotheses, and the establishment of larger meanings. This classification, of course, is not fixed; it simply indicates some

general distinctions which will often obtain. Good lesson assignments for individual study should grow out of class periods or should lead into them, should be interesting, should have definite elements, and should have indefinite elements. Both group and individual study may well take place during the regular class periods, thus largely doing away with home study in the elementary school.

### Study Exercises

Refer to the activities described on pages 19, 31, 55, 106, 111, 124, 135, and 147. Carefully outline the possible assignments in these activities according to what is described or what you think would happen in such a situation. Outline these things about each:

1. Is the assignment made by the teacher, the pupils, or by both?
2. Does the assignment grow naturally out of the readiness of the children?
3. Is the assignment essentially for group or individual study? (Notice whether an assignment is always one or the other.)
4. Is the assignment an integral part of the activity?

## CHAPTER XIII

## HOW TO USE THIS BOOK IN IMPROVING TEACHING

**The need for effort to coordinate theory and practice.** One of the commonest criticisms leveled against professional schools of all kinds is that the work given in the classrooms of the schools is not practical. Doctors, lawyers, dentists, engineers, and school teachers are likely to maintain that the work in their professional courses was too theoretical, and that when placed in a practical situation, they have derived little help from the lectures and training they received.

One may well ask when such a criticism is made whether the fault lies entirely with the instruction. Is it not also possible that one trouble is that the graduate does not spend sufficient mental energy when he meets the practical situation to bring to bear some of his theoretical training on it? It is, of course, difficult to apply general principles to specific situations, and the tendency is to forget the principles and worry through the specific situation as best one can at the time.

Perhaps there is no one profession whose members are more critical of the training they receive or the books that they read than the teaching profession. Any one who talks with teachers will constantly hear the criticism that this or that book is too theoretical. The writer is frequently tempted to respond, "Pos-

sibly so, but it might be worth while trying to see whether some of the theory might not work if a little ingenuity were used in putting it into application."

It is with a view to helping in this process of application that this chapter is written. The use to which this book may be put is twofold. First, it may help, after a piece of work has been finished, to judge how well it was done and what changes might be made the next time a similar procedure is attempted. Second, it may assist the teacher in planning his work on a given section of his course of study.

In considering the first use above, one would do well to remember that one of the most serious problems which faces the supervisor today is that of getting the teachers into a mental attitude of intelligent criticism of their own efforts. Teaching is hard work. Day after day the teacher has to face the strain of controlling and directing twenty to forty different personalities in such a way that they will learn how to control and direct themselves more efficiently. The strain of this work is so great that teachers frequently find it almost impossible to be critical of their own work while it is going on. The writer, however, has much sympathy with any attempt on the part of the teacher to be constructively self-critical. He offers this advice, therefore, in the hope that it may be possible to accept it without adding too great a strain to the teacher's work.

Let us suppose that a teacher says to himself at the beginning of the day, "I shall, of course, do the best teaching I can throughout the day, but at ten o'clock I am going to give a lesson in geography. I shall plan

the lesson with great care, be very attentive to notice the actions of the children throughout, both mental and physical, and watch my own questions and methods of procedure. At the end of the period I shall assign some sort of work for the children to do and shall set down on paper enough notes of what I did to enable me, in my study this evening, to reconstruct the recitation in my own mind for a thorough critical study.

Let us suppose that a teacher does this with perhaps two or three lessons a week, and that in his study of these lessons after they have been given, he applies to his work the most careful analysis of which he is capable. The writer believes that such a procedure would be prolific of real growth in technique and that such growth would carry over into his teaching of all of the different subjects.

**How a teacher may use this book in judging his own instruction.** Supposing that the teacher should adopt this plan. How could he use this book in his study work? First, he would examine the readiness which he secured in the classroom. He would ask himself, "How well does this readiness measure up to the two criteria which are laid down in Chapter V? Was the readiness of the sort which exists to a considerable degree and in a productive way in adult life, and was it closely connected with the subject matter? How effective was the readiness, and how well did it lead into the exercise which followed?"

With regard to the exercise, the teacher would ask himself whether the facts and ideas in the recitation period were learned in isolation or whether connection

forming between facts and ideas was prominent. Was this connection forming done on the basis of a thought problem in which the children were vitally interested, or was it merely on the basis of what the book said, or of mnemonic devices of various sorts? What about the memorizing that was done? (Of course many lessons will have no memorizing at all.) Was the memorizing efficiently conducted or was the drill ineffective? Was the use or need of the material on which there was drill clearly shown? How vivid were the facts in the lesson? Was the subject matter of the lesson academic generalizations or was it of a sort which concerns details about real people?

Finally, what sort of effect was the result of the class exercise? Did the children seem satisfied with their work? If so, was the satisfaction of the dynamic type which would carry them into more study? If there was lack of satisfaction, was it due to a faulty articulation between the readiness and the exercise, or was it, perhaps, due to unwise selection of the activities used to bring about exercise?

The writer's experience with a number of classes in supervision has convinced him that one great difficulty with the supervisor in his judgment of lessons has been the lack of any such sound series of questions. If asked to study a recitation, the average student in supervision classes would have great difficulty to spend profitably more than about fifteen minutes. If this be true of supervisors, how much more likely is it to be true of teachers? If, however, the material presented in this book is used in the practical fashion described above, it is hoped that a

profitable period of study might follow the teacher's investigation of his own lesson.

**A diagnosis card for judging a lesson.** In directing study classes, the writer has found a diagnosis card effective in directing his students' attention to the various elements of the teaching situation described in this book. This diagnosis card, with the directions for using it, is reproduced below.

DIAGNOSIS CARD

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| I. | *Phase of Teaching* (Check) | | Readiness | | Exercise | | Effect |
| II. | *Readiness* | 1. Criterion I | 1 | 2 | 3 | 4 | 5 |
| | | 2. Criterion II | 1 | 2 | 3 | 4 | 5 |
| | | 3. Intensity | 1 | 2 | 3 | 4 | 5 |
| | | | 1 | 2 | 3 | 4 | 5 |
| | | | 1 | 2 | 3 | 4 | 5 |
| | | | 1 | 2 | 3 | 4 | 5 |
| | | | 1 | 2 | 3 | 4 | 5 |
| | | | 1 | 2 | 3 | 4 | 5 |
| III. | *Exercise* | 1. Connection of facts | 1 | 2 | 3 | 4 | 5 |
| | | 2. Connection forming on the basis of thinking | 1 | 2 | 3 | 4 | 5 |
| | | 3. Vividness of material | 1 | 2 | 3 | 4 | 5 |
| | | | 1 | 2 | 3 | 4 | 5 |
| | | | 1 | 2 | 3 | 4 | 5 |
| | | | 1 | 2 | 3 | 4 | 5 |
| | | | 1 | 2 | 3 | 4 | 5 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | 4. Efficiency of drill or memorization | 1 | 2 | 3 | 4 | 5 |
| IV. *Effect* | 1. Intensity | 1 | 2 | 3 | 4 | 5 |
| | 2. Stimulative power | 1 | 2 | 3 | 4 | 5 |

V. Generalizations about study: (Write them in, if present.)

## DIRECTIONS FOR USING DIAGNOSIS CARD

I. *Phase of Teaching.* Please check Readiness, Exercise, or Effect depending on which phase of the teaching and learning process seems to be chiefly in evidence in the recitation. This does not mean that all three laws may not be exemplified in one lesson. It simply means that usually the teaching process on any one topic is likely to divide itself up into the three phases as mentioned and that judgment with regard to an individual lesson is influenced by the phase which is being used at the time.

II. *Readiness.* 1. Criterion I is as follows: Is the readiness of a type which exists to a considerable degree and in a productive way in adult life? Put a parenthesis around 1 if the criterion is exemplified exceptionally well; around 5 if very poorly. Positions between 1 and 5 are represented by 2, 3, and 4.

2. Criterion II is as follows: Is the readiness closely connected with the subject matter which is being studied?

3. Intensity: 1 represents the readiness of a child building a playhouse in the woods, and 5 represents the readiness of a child being forced to rake a lawn on Saturday afternoon when the other boys are going swimming.

There are five lines of figures after this heading. This arrangement makes possible five different estimates made at different times during the recitation period. Readiness should

persist throughout a recitation period, but sometimes it fluctuates considerably in intensity, and in these fluctuations may lie the most pregnant suggestions for diagnosis of difficulties. By connecting the various numbers marked a crude graph of the intensity of readiness throughout the lesson is obtainable.[1]

III. *Exercise.* 1. Connection of facts: Frequently in the older type of recitation children dealt with individual facts in an entirely isolated fashion. Learning means connection forming, and if you put a parenthesis around 1 after this heading, it means that you believe the facts present in the recitation were connected in the instruction and in the minds of the children.

2. Connection forming on the basis of thinking: If facts are connected with one another in the recitation period, there must be some basis for this connection. If it is done purely on the basis of mnemonic devices or entirely artificial classroom schemes, then it is poorly done and you would put a parenthesis around 5. If, on the other hand, the facts form various sorts of thought sequences, the circle will go around 1.

3. Vividness of material: Is the material that is presented cold, academic, without relationship to either the life and interests of the children or to things which are familiar to them; or is it vitally interesting, easily translated into clear mental pictures?

4. Efficiency of drill or memorization: This may or may not be present in any given lesson. If it is present, the ideal is one hundred per cent of the pupils working one hundred per cent of the time during the time of memorization or drill.

IV. *Effect.* 1. Intensity: By intensity we mean: Do the children seem thoroughly satisfied, not only at the end but throughout the lesson, with the learning activities in which they are engaged?

[1] How this works in interpretation is indicated in the description of a typical diagnosis card on page 183.

2. Stimulative power: A parenthesis around 1 would indicate that the satisfaction with this work was of a dynamic sort, leading into further valuable and interesting activities. A parenthesis around number 5 would indicate that the children were delighted to finish with this particular task and appeared to hope that they would never again have to do anything of the sort.

V. *Generalizations about study.* In addition to helping her pupils through a sound study process, every teacher should be concerned with raising the level of the consciousness of her pupils and helping them to understand clearly certain generalizations about study, either with regard to the particular subject they are studying or to study in general. For example, a teacher is teaching arithmetic. A child brings in a perfectly preposterous answer to a problem. In this situation a teacher should do two things. She should first help the child to see wherein his solution is wrong and show him how to study the problem to get the right solution. Second, she should bring out the generalization about the study of arithmetic that when doing problems it is well to estimate the probable size of the answer as a sort of informal check on the solution.

Psychologists tell us that generalizations are not acquired from one illustration. It is not meant that such a generalization as was described above will be learned through one statement of it. The wise teacher, however, not only guides her pupils into paths of good study but also makes them conscious from time to time of generalizations about study, so that eventually these generalizations are learned through practice.

In order to show how this card may prove of value we are including a report of a lesson seen by the writer, with his marking of the diagnostic card.

## DEMONSTRATION LESSON—THIRD GRADE

### Subject: The Weather

The following was written on the board:

Temperature Weather Wind direction Velocity Sky

Teacher: I'm wondering about your notes. What did you find out about the weather?

Betty Lee (reads from her paper): Weather: Slow wind, sky gray.

T.: Betty Lee decided that the wind was slow.

P.: The wind was from the south.

Another suggested that it was southeast.

T.: Betty was talking about velocity.

Betty reads on: Temperature 50.

A boy gives his report: Wind slow and south, temperature 50.

T.: Did all get the same? Bob, what did you say?

Bob: Temperature 50, wind slow and south. But I made a mistake in that—I could see it was southeast.

T.: Yes, we could see it was southeast.

Teacher begins to fill in weather chart on blackboard.

T.: What does southeast mean?

P.: It means the wind is from the southeast.

T.: What does it indicate?

A child suggested it meant rain.

T.: How did you know that?

A variety of answers; warm.

T.: What wind means fair weather?

Pupils: West, east, north, northwest.

Billy: Northwest wind means it will clear off.

T.: Why, Billy?

Billy: Because it will drive away the rain.

T.: Why? I think that is a good point. Let's put that down on the board. (Writes: Why does a north wind mean fair weather?)

P.: It is so cold.

T.: Yes, that is one reason—because it is colder.

Billy suggested that the north wind sometimes makes snow because it freezes.

T.: Let's have more about the temperature.

P.: 50.

T.: It was a little over 50. Is it getting warmer as the temperature goes up?

Pupils: Oh, yes.

T.: Any reason?

Billy: Oh yeah, because it's getting warmer.

T.: Last week one day what was the temperature? Does any one remember?

P.: 11 below.

P.: 14 below.

T.: Some one said 11. Was that cold?

Pupils in chorus: Very cold.

T.: Yes, very cold. The temperature was below freezing but now it is much warmer.

A girl suggested that this was because it was getting near spring. There was more or less talking and the teacher evidently didn't get it.

T.: Ellen, what did you find out about the weather? I'm going to ask you to put the paper down. Was there a fog?

Ellen: Yes.

T.: How did you know?

Ellen: I saw it.

T.: Where?

John said he saw it near the river. Ellen saw it because she couldn't see far. Several broke in. There was a lot of talking, but Billy gained the upper hand and said he thought you could see through fog with a telescope.

Billy: It is mist more than fog.

T.: What is the difference between fog and mist?

Several pupils: Fog is thicker.

T.: I'll put that down. Let's be sure about it. Billy, would you find out and prove it? Billy thought he could.

Johnny: I put fog, and then rain coming also.

T.: How did you know, Johnny?

P.: Because when there is heavy mist or fog it snows or rains.

T.: Let's see if we can all find out. How will we?

P.: The dictionary.

Billy again took the floor and rambled around until he finally said that there was mist all over. The teacher complimented him with: "That's good thinking, Billy."

Richard thought he had a book which would have something to say on the subject.

T.: Could you understand what it says in the book?

Richard: Mother could help me.

T.: What can we say about the wind? Can we say slow, gentle? Is the velocity slow, soft, gentle? Is a soft wind a fast wind?

Several thought it was.

P.: I think it's right in between.

T.: Then soft isn't a good word. (Strikes it out.) Was it soft or gentle?

One boy thought it was real fast because he could see the clouds go by.

T.: I didn't see the sun. Did it come out?

P.: I could see the clouds go by fast.

A little girl got up and gave the class the information that the clouds seem to be moving but they are not really—it is we who move.

A boy arose and gave his version of the matter: "The world goes around the sun and takes us around. It's just like a wheel. We go around with it."

T.: We won't take that up now. What did you find out about the sky?

P.: Foggy.

T.: But we don't say *foggy* about the sky, we say gray, or cloudy, or something like that.

Billy, at the board, erases "soft" under "wind direction."

T.: You might also erase "snow." (He does it.)

T.: From all we have found out about the weather, what are the chances for the rest of the day?

One child thought it would stay this way, but another suggested that it sometimes clears up.

T.: What would make it clear up?

P.: If the wind changes.

Below is the diagnostic card filled out by the writer at the time of the observation of the accompanying lesson.

DIAGNOSIS CARD

| I. *Phase of Teaching* (Check) | | Readiness | Exercise | Effect |
|---|---|---|---|---|
| II. *Readiness* | 1. Criterion I | (1) 2 3 4 5 | | |
| | 2. Criterion II | (1) 2 3 4 5 | | |
| | 3. Intensity | 1 (2) 3 4 5 | | |
| | | 1 2 (3) 4 5 | | |
| | | 1 2 3 (4) 5 | | |
| | | 1 2 3 (4) 5 | | |
| | | 1 2 3 (4) 5 | | |
| III. *Exercise* | 1. Connection of facts | 1 2 (3) 4 5 | | |
| | 2. Connection forming on the basis of thinking | 1 2 3 4 (5) | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | 3. | Vividness of material | 1 | (2) | 3 | 4 | 5 |
| | | | 1 | (2) | 3 | 4 | 5 |
| | | | 1 | (2) | 3 | 4 | 5 |
| | | | 1 | (2) | 3 | 4 | 5 |
| | | | 1 | (2) | 3 | 4 | 5 |
| | 4. | Efficiency of drill or memorization | 1 | 2 | 3 | 4 | 5 |
| IV. *Effect* | 1. | Intensity | 1 | 2 | 3 | (4) | 5 |
| | 2. | Stimulative power | 1 | 2 | 3 | (4) | 5 |

V. Generalizations about study: (Write them in, if present.)
(None)

It is, of course, impossible for the reader completely to reconstruct the situation in the classroom from the printed report of the lesson. Many things in the attitude of the children which can be seen by an observer are lost in a written statement of what happened in a lesson. Some of the ratings on the diagnostic card, therefore, may not first seem to be justified because the reader did not see the lesson itself.

On the diagnostic card the first point concerns the phase of teaching. It seemed to be evident during the lesson that the chief purpose of the teacher was exercise or learning, hence that word is checked. The next marks concerned the two criteria for the readiness. In using the diagnostic card, the writer always attempts to discover the teacher's idea for the readiness in the class and not whether this idea worked out satisfactorily in the recitation. He also attempts

to generalize the teacher's purpose in her stimulation of readiness before he attempts to apply the criteria. Generalized in this way, the readiness which the teacher attempted to secure in the lesson under discussion might be stated somewhat as follows: To discuss intelligently and with more or less scientific data, ideas about the weather. The writer marked 1 for both criteria because he felt that they were satisfactorily applied. When it came to the intensity, the reader will note that he marked first 2 then 3 and then the next three 4's. The children started the recitations with some degree of readiness, but except for a very few the readiness grew less and less as the period went on.

Under exercise the writer marked 3 for connection of facts, because the facts were more connected than would have been the case had 5 been marked, yet the children did not seem to make much connection between the various items of information. For the next item; namely, "Connection forming on the basis of thinking," the writer put a parenthesis around 5 because there seemed to be almost no thinking going on. Under the next topic, "Vividness of material," the writer marked 2 throughout because the children seemed to be visualizing the material they were handling quite satisfactorily. There was no drill or memorization in the lesson.

Under effect the writer marked 4 for both items. He could find little satisfaction in the work, and the period closed without any indications of a desire on the part of the children to pursue the topic any farther.

Looking over the diagnostic card in its entirety, we notice the fact that as shown in the two criteria the teacher had a good purpose. The readiness, however, did not persist. To find the reason for this, we look over exercise and note that but little thinking was going on and that the facts were not joined together in orderly sequence. Disjointed and commonplace facts are likely to become very boring to children, but they would have become interesting had they been used to answer a challenging thought problem. Our diagnosis in this case is confirmed by the low scores under the items on effect.

If the teacher in the lesson described above either scored her own lesson, as shown on the card, or was shown the card as a statement of another person's judgment, she might well say to herself somewhat as follows: My plan for the lesson was all right as far as it went, but it was not thought through sufficiently, so that there was clearness and coherence in the thinking of my pupils. Possibly if I had thought out an organization myself, had written down key questions, or had attempted to get the class consciously to organize the data more than I did, my lesson would have been much stronger. In the future I must watch the organization of the material in the lessons I give.

**How a teacher may use this book in planning his instruction.** We have previously stated that this book may also be of value to teachers in planning their work. We will take it for granted that the teacher is teaching in a public school where his course of study in any subject is fairly well defined. Let us suppose that he has about finished one topic and is

beginning to think about the introduction of the next topic. If he follows the outline suggested here, he will first ask himself how he is to secure readiness for the topic. He will determine first whether there have been any recent world or local events to turn the attention of the children toward the topic so that he may set the stage for the study through newspaper clippings, through pictures, or through discussion. If such is the case, he will probably spend several days in the readiness phase of his work, introducing a variety of interesting and stimulating subject matter and leading the children to propose questions and problems for further study. Supposing, however, that nothing has occurred recently to make a natural introduction to the next topic. He will say to himself, "What kinds of material would stimulate *me* to study this subject?" He will then arrange that such types shall be present in the classroom. He will use much concrete material in the readiness phase of his work, such as pictures, models, and graphs. He will try to get his children to appreciate some of the biggest and most interesting phases of the topic and to propose questions and problems to which they want to know the answer. In his plan he will keep clearly in mind that during the stimulating part of his work on this topic he must introduce the most interesting and appealing material he can get.

When he plans his exercise phase of the work, he will help the children to organize the material into outlines on the basis of their problems, will help them to relate the things they learn to other things which they already know, and will help them to decide

which facts they ought to memorize. In the effect phase of the work he will lead them to estimate the success of their activities and will assist them in appreciating the concrete results of their study.

Even though the teacher should do this with each topic he teaches and lead the children through a thoroughly sound process of study, he must still plan, as indicated in the previous chapter, for the establishment of certain general principles of study. For example, suppose that the children have been studying the critical period in American History. One of the phases of exercise will probably be the establishment of certain definite facts and dates to be thoroughly memorized. The teacher may well work out with the children the principle of study, that one of the final points in any study is to decide which are the most important facts, and then definitely set about memorizing them. This is a thoroughly sound principle of study and one which every good student applies whether it be in school, in business, or in his profession. As has been pointed out, merely to learn a principle is useless. On the other hand, it is equally true that the children will not learn a principle through using it in connection with but one study exercise. If, however, the principle of study referred to is brought out a number of times in connection with topics of the school subjects, the principle eventually will be learned.

**Summary.** It is not enough for a teacher to be thoroughly conversant with modern ideas in education; he should also expend much serious effort to put theory into practice. To do this, he may well select

every week, a few of his lessons for careful scrutiny, acting, in a way, as his own supervisor. This book will assist him in two ways; first, in judging the success of a given piece of work through applying its principles to the class exercise; and second, through assisting him to plan the various phases of a future teaching unit.

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